

Climate Change in the Arab Countries

Defense and Confrontation Mechanisms

The Palestinian Case

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Introduction

In recent years, the Arab countries have witnessed increasingly high temperature and less frequent and more intense rainfall. Water has emerged as one of the most vulnerable resources of the region. Arab countries' warm climate causes drought and decreases available water, which affects agriculture.

In the summer of 2012, the Arab East in general and Palestine in particular witnessed clear extreme changes in temperatures that, sometimes more than ten degrees from the general annual average. This was accompanied by significant increases in drought severity and humidity, even in areas distant from the Palestinian coast. Crops may adapt to changes in weather, but the problem is that the changes may arrive suddenly and in one blow, as was the case with recent summer heat waves. The unpredictability of climate change makes it difficult to adapt effectively. And though we cannot predict with certainty, we can estimate that heat waves will increase in number and intensity.

In the occupied Palestinian territory (oPt), destructive practices of the Israeli military and government harm the environment. However, we must not lose sight of Palestinians' role in polluting the environment, even if this factor is small compared with the degradation resulting from Israeli practices. An absence of regulations that determine the ceiling of toxic emissions from Palestinian vehicles and industries, in addition to an absence of laws concerning excessive use of chemical pesticides and fertilizers means that industry, agriculture, and hundreds of thousands of cars can pollute freely.

There is also an absence of strategies to take advantage of renewable energy sources in order to preserve the Palestinian environment. These could mitigate the negative effects on climate in the region and reduce Palestinian dependency on non-renewable energy sources like fossil fuel, the supply of which is controlled entirely by the state of Israel.

Now more than ever, civil and official Palestinian institutions have much to do to limit the use of energy from oil that endangers the environment and human health and/or to replace it, where possible, with clean renewable energy. Areas of focus may range from awareness and training to the technical development of industrial, agricultural and service projects that use renewable energy such as solar, wind, biogas, and so on. This may include, for example, solar electrification of many Palestinian areas, making the most of natural lighting, and so on.

A focus must also be placed on the national developmental dimension, with the goal of reducing dependency on fossil energy (electricity, gasoline, diesel fuel, gas and hydrocarbons in general), the quality and quantity of which is controlled entirely by the state of Israel. This would reduce Palestinian expenditure on Israeli oil energy and thus enhance the process of recycling domestic capital in the Palestinian market. Moreover, renewable energy projects in remote Palestinian villages encircled by Israeli settlements and military bases would contribute to Palestinians' self-sufficiency on their own land.

Even when Palestinians produce a part of the electricity, as is the case in Gaza Strip, where Gaza Electricity Company covers about 30% of the Strip's electricity needs, the only source of fuel for electricity production is Israel. The source of the rest of Gaza's electricity (about 70%) is Israel, while the West Bank depends entirely on electricity that is purchased from Israel. It should be noted that Israeli-Palestinian agreements prevent the Palestinian Authority from buying fuel from a source other than Israel. The Israeli occupation often affects the functioning of the Gaza power station and water and wastewater pumps; Israel withholds or allows the entrance of fuel to Gaza as it pleases, causing the power plant and pumps to repeatedly stop working for long periods of time. This in turn disrupts the functioning of hospitals, industrial plants, and bakeries—a crucial source of food for Gazans.

It can be said that both the environmental-climatic and national development dimensions require serious work towards freedom from absolute Israeli domination of fuel and electricity as well as the establishment of infrastructure to generate electricity from solar energy and other forms of renewable energy. Experts and workers in the environment and energy sectors should be encouraged to undertake studies regarding the feasibility of investment in the field of alternative, effective, and energy-saving technology and projects. This may include, for example, research to provide the necessary information about the best locations to benefit from solar energy, average sun brightness, average daily radiation intensity in different areas, the availability of wind power in cities, and other necessary scientific and practical information.

This study aims at contributing to this kind of research by outlining trends and indicators related to climatic infrastructure and reality in the Arab region in general, and in Palestine in particular. It also discusses existing policies and strategies, and makes further recommendations, to address climate change on the Palestinian and Arab level. In addition, the study proposes ideas, solutions and practical mechanisms to reduce carbon emissions within local economies and to encourage and promote the use of environmentally- and public-health-friendly energy alternatives.

This study is aimed at large segments of society including: environmentalists, experts and environmental specialists, development

workers, researchers and students, policy makers, NGOs, grassroots organizations, and the private, public, and government sectors. The aim of this study is to provide readers with the knowledge on trends, policies and applications needed to bring about a qualitative reduction in greenhouse gas emissions and to seriously confront climate change. Ultimately, it hopes to encourage different social, economic, and political strata to actively participate in alternative environmental development that works toward the establishment of environmentally clean communities and economies in the Arab world, free from pollutants and toxic emissions destructive to our climate, health and existence.

This is the first Arab study of its kind in terms of comprehensiveness, professionalism, and the level of both theoretical and applied scientific content. The scientific background of the study is based on a combination of data from theoretical and applied research, and from practical-technical experience and expertise.

Also, I extend my sincere thanks to Waleed Mansour, the Egyptian environmental expert who contributed to reviewing and evaluating this study before publication and therefore enriched its content.

Last but not least, I express my thanks and appreciation to Miss Rafaella Lima who accomplished the English version editing of this study.

George Kurzom

October 2012

The background of the slide is a collage of four grayscale images. The top-left image shows a close-up of a concrete wall with vertical rebar. The top-right image shows a steep, rocky hillside with a single evergreen tree. The bottom-left image shows a close-up of a concrete wall with vertical rebar. The bottom-right image shows a close-up of a concrete wall with vertical rebar.

1

Trends and Indicators

Reports from climate experts confirm that air pollution and continuous large emissions of carbon gases, especially carbon dioxide, are the main cause of global warming, which is expected by some experts to imply an increase in temperature between 1.4oC and 5.8oC in the period between 1990 and 2100. This may lead to a huge evaporation of freshwater resources and a rise in sea levels due to the melting of polar ice caps by more than three meters, which may cause a large number of coastal cities and states to be submerged in water.¹

Reports of climatic patterns issued by the IPCC (Intergovernmental Panel on Climate Change) expect temperatures in the Arab region and Central Asia to rise by about two degrees Celsius in the period between 2030 and 2050, which will exacerbate problems of soil erosion and cause agricultural production to drop extremely, in some areas so much as to reach the level of natural disaster². Some forecasts go so far as to say that radical changes will occur in the weather patterns in the form of devastating storms and prolonged drought in many areas; causing devastation of these areas and the displacement of tens of millions. Famine, water pollution, water scarcity, and floods will cause the proliferation of diseases and a huge rise in the mortality rate.³

Because of the significant rise in air pollution resulting from increased emissions from industry as well as automobiles, countries with large population and poor resources will face tremendous difficulties in dealing with problems of poverty, provisions of clean water, and adequate amounts of food, energy, and sewage systems, not to mention the contamination of food and water caused by an increased use of chemical pesticides. Scientists expect extreme weather conditions such as violent storms, severe drought, desertification, and unexpected climatic events may destroy the livelihoods of millions, particularly in the agricultural and fishing sectors. As with all environmental disasters, here it is also expected that millions of people will be affected, especially in developing countries where the capacity to cope with environmental destruction is extremely limited.

The number of potential environmental refugees is also unknown, as environmental migration is closely associated with migration caused by political, humanitarian or economic reasons. This is especially true in areas where there is fighting for basic resources such as water and agricultural land. The war in Sudan's Darfur region is one example: there is a prevailing belief that drought was a central cause of the war there that generated large numbers of refugees from the region.⁴

1- Kurzom and Omar et al., 2007, pp. 155-160

2- Heinrich Böll, 2009, p.6

3- Ibid.

4- Ibid, p. 57

Record Figures: Unexpected Climatic Fluctuations

In November 2009, heavy rains fell in various parts of Palestine and caused torrents and floods in the cities. Indeed, many streets and cars in West Bank towns were submerged by the floods. A few years previously, especially in November 2004, snow fell in the northern regions⁵. In contrast, not a single drop of rain fell in November 2010. In fact, it was not just the month of November to register a record of poor rainfall and high temperatures—the hottest November in fifty years. 2010 was the hottest year on record since the first thermal measurements were taken in the early twentieth century.⁶

For the first time in almost ten years: Rain in 2011-2012 exceeded the annual rate

In January 2012, the number of rainy days was the largest in one month since measurements of precipitation in Palestine began. In the same month, some northern areas recorded rainfall in 29 out of 31 days.⁷ According to the definition of meteorologists in Palestine, a rainy day is one that records 0.1 mm of rain or more. Accordingly, most of the rain registration stations in the northern regions documented 26 rainy days or more, compared to the previous record of 25 rainy days recorded in January 1947.⁸ This figure also exceeds what was recorded in 1969 and 1992, which had two of the rainiest months since the start of rainfall documentation: 24 rainy days in January 1969 and 24 rainy days in February 1992⁹ (see table no. 1). The record in the number of rainy days could be applied to the amounts of rainfall as well. In Jenin and the northern regions of historic Palestine up to Haifa and Nazareth and the Galilee, rainfall amounts in January 2012 ranged from 250 to 300 mm, the highest rainfall with 1.5 - 2 times the cumulative annual rate of precipitation in the same month. Rainfall levels in mountainous and central areas, meanwhile, approached the cumulative rate,

whereas in southern areas such as Hebron and the Negev, rainfall remained below average.¹⁰ Despite the importance of these data from a statistical point of view, however, we cannot accurately predict future trends.

For comparison, rainfall in 2011 in the northern regions approached the cumulative annual average and even exceeded it in some locations, while winter in the same year in Jerusalem, Ramallah, and in the central mountain regions was considered the driest since 1998. The amount of rainfall before 27 March 2011 was about 300 millimeters, less than 60% of the normal rate until this period.¹¹

(Table no. 1)

*Record figures of rainy days (northern Palestine)**

Year and month	Number of rainy days
1947 (January)	25
1969 (January)	24
1992 (February)	24
2012 (January)	26

* This table is derived from numeric data mentioned in the preceding paragraphs

For example, in late February 2011, heavy amounts of rain fell in northern Palestine, to the extent that the amount of rainfall in some northern areas amounted to more than 45 millimeters in one day (26 February 2011).¹² On the same day, not a single drop fell in the central and southern regions. This phenomenon had been the case throughout the winter of 2010-2011 in the sense that Palestine was split into two parts in terms of rain: the northern areas received satisfactory amounts of rain and close to the annual rate, and central and southern regions almost none, especially in areas south of Tulkarem where the water budget was deteriorated.¹³ As of 27 March 2011, quantities of rain in the mountainous areas of Nablus, Ramallah, and Jerusalem did not exceed 60% of the usual annual rate and did not exceed 55% of the total annual average.¹⁴

5- Afaq, issue 3

6- Ibid.

7- Afaq, issue 42

8- Ibid

9- Ibid

10- Ibid

11- Ibid

12- Ibid

13- Ibid

14- Ibid

(Table no 2)

*Rainfall in the northern and central regions (historic Palestine)**

Year (since the beginning of rainy season)	The amount of rainfall and the region (mm)	
	Northern region	Jerusalem and central region
2010-2011 (until 27 March)	530	300
2011-2012 (until 21 February)	540	400

* This table is derived from numeric data mentioned in the preceding and subsequent paragraphs

Except for the winter of 2012, in which January was the rainiest month, February was the rainiest month in Palestine in recent years. Although there was rainfall for a few days in February 2012, the amount involved was less than in February 2011. In the period February 1 to February 21, 2012, the amount of rainfall in the northern regions exceeded 150 mm; while in the central regions it exceeded 100 mm in the same period.¹⁵ Since the beginning of the winter of this year until 21 February 2012, more than 540mm of rain fell in northern Palestine, which exceeded the annual average of 539mm¹⁶ Jerusalem and central regions have exceeded 400 mm of 537 mm (cumulative annual rate), or about 75% of the total annual rate¹⁷ (see table no. 2). In total, the amount of rainfall for the winter of 2012 in historical Palestine exceeded the cumulative annual rate for the first time in almost ten years.

Climate changes in Palestine

Different studies conducted in Palestine in recent years have showed that Palestine has been observing clear changes and fluctuations in climate. The following is a summary of the most important data at this level:

- **Temperatures:** Summer became warmer and winter became colder. There was an increase in the frequency of abnormal temperatures in relation to seasonal averages, in addition to increasing significantly the number of hot days in particular, and an increase in the frequency of heat waves in terms of duration and intensity.¹⁸
- **Sea level:** different research pointed to a rise

15- Ibid

16- Ibid

17- Ibid

18- The Palestinian Forum for Israeli Studies (MADAR) 2008, p. 54



of about 10 millimeters per year, and this rate is consistent with the pace of sea-level rise in other areas in the Mediterranean basin.¹⁹

- **Precipitation:** in the Mediterranean region, an evident downward trend in the amount of annual rainfall with accompanying drought and desertification was noted.²⁰

Different climate models dealing with the Mediterranean and Arab countries monitor the trends of high temperatures and drought and show another rise in air temperatures accompanied by a decline in the rates of precipitation.²¹ The term “drought”



19- Ibid

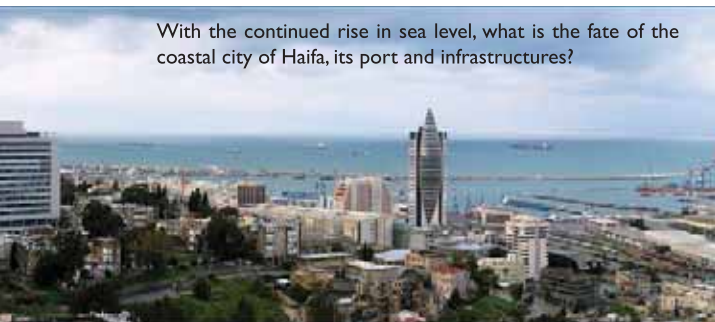
20- Ibid

21- Ibid

was repeatedly applied to Palestine in the last ten years due to the lack of rain, and will likely continue to apply. It is not expected that the rainfall situation will be much improved over the long years to come. Climate experts predict that in the coming hundred years, Palestine will face further droughts that will increase in length. According to a recent study that examined the phenomenon of drought in Palestine during the last one hundred years, researchers predicted the likelihood of drought in the coming hundred years, and specifically in the period between 2000 and 2100. They predicted that there would be an increase in periods of drought, from 12.5 periods of drought in the last one hundred years to more than 20 periods of drought in the coming one hundred years (note that most of the periods of drought will be in the last years of the twenty-first century). The length of the periods of drought is expected to increase gradually from 3 - 4 years on average in the first decades of the current century—as was the case in the last hundred years—to up to 7 - 8 years in the last decades of the same century.²²

The aforementioned research predicts that a decline in the amount of precipitation by 25% is expected.²³ Moreover, not only will the periods and length of droughts increase, but the intensity will also increase. If the water shortage in the current times of drought is about one thousand millimeters, this shortfall could reach about three thousand millimeters in the future.²⁴ This research is important because it can serve as a compass for the future of water in Palestine, and can help in planning future water policies. However, strategic water planning is currently impossible in the West Bank and the Gaza Strip, due to the absolute Israeli dominance over water resources and groundwater basins.

With the continued rise in sea level, what is the fate of the coastal city of Haifa, its port and infrastructures?



22- Afaq, issue 19

23- Ibid.

24- Ibid.

Environmental disaster

Is there a relationship between these phenomena and global warming? A relationship seems to exist, as experts consider previous climate patterns there is strong evidence regarding catastrophic climate change caused by human activities. However, experts are not rushing to definitively confirm a relationship between previous data and global climate change, which is measured in tens or hundreds of years. If we deal with previous phenomena by a scale of seasons or a few months, then we can talk about trends related to climate change. However, the scientific problem lies in knowing whether previous figures fit long-term trends that may become clear only after decades. Experts who warn of climate change say that climate temperatures will continue to rise unless there is a significant reduction in the amount of greenhouse gases in the atmosphere. They also warn that global temperature may increase to six degrees Celsius above the level before the industrial revolution and that the consequences will be dire.²⁵

Popular proverbs are the best meteorologist

Some attribute the scarce rainfall situation of recent years, as well as winter frosts, to climate change. But the phenomenon of frost in some parts of the Arab region has occurred for thousands of years, and in Palestine occurs specifically between early and mid-January of each year. With the advent of this period each year, many people remark that the new frost wave is abnormal and the first of its kind in severity. Some attribute the “new” severity to the climate change that is sweeping the globe.

In fact, waves of bitter cold and frost have been familiar and natural weather events in our region for thousands of years and have not undergone any significant change until now. If we conduct a climate survey for our region, we will find that decades ago, weather was sometimes harsher in the rainy season than has been the case in recent years. This is confirmed by Arab proverbs that serve as a sort of popular meteorologist, representing the accumulation of rich experiences and knowledge of our ancestors, over hundreds of years. Of course, there are many relating to agriculture and the seasons. In relation to frost, one of these proverbs explains: “between Christmas and Epiphany the water

25- Richter, 2011, pp. 40-46.

stops like a column.” That is in the period between Christmas (January 7 of each year according to the Eastern Christian calendar) and January 19, when water freezes in place, “like a column.” The frost is usually formed in the period between early and mid-January. In fact, the bitter cold and frost in January is considered natural and necessary for fruit trees as high temperatures in January would harm them and cause them to bloom prematurely. Hence the proverb: “O crazy almonds you bloom in January”, because the almond trees are the first to bloom between the fruit trees, preceding the flowering of all other trees.

Although our region has witnessed droughts and reduced rain over the last eight years (pre-2012 winter season), we cannot automatically attribute this to global warming. The evidence is that the month of January 2012 in Palestine, compared with the same month in the decades that preceded it, broke a record in the quantities of heavy rains. Even more than that, it is known in areas like Palestine, Lebanon, Syria and Jordan, that the month of January may be rainy or too dry. This what is known as the “Marba’ania” which stretches forty days (from 22 December to 31 January) and during which the extreme cold intensifies, with snowfall in some areas, but during which rain may be very scant. This is confirmed by Palestinian popular proverbs, such as: “Marba’ania, ya shams tehreq, ya matar yeghreq”, which means “Marba’ania is a burning sun or a submerging rain!” Or: “Marba’ania ya betrabeh ya betqabeh”; that is: “Marba’ania may be either nice or ugly”! And if the rain is scarce in February, so March may offset it with some rain, and this is what is known in Palestinian climatic heritage as “Mustaqrida’att.” “Mustaqrida’att” is seven days, 3 February to 4 March, and is so named because February, which is the shortest month of the year, “gets a loan” of some days from March in order to “prolong his age,” so more rain will fall. This is expressed by the following proverb, in which February talks to March which follows him: “March, O my cousin, four of you and three of me, and woe unto you, old man!” Or the following proverb, which contains the same meaning: “If rain delays in February, then you might have some from “al-“mustaqrida’att”! We have strongly observed this phenomenon, specifically in late February and early March 2012.

Of course, we should monitor temperature changes and rainfall levels in accordance with re-

cent climate research. But popular proverbs in the Arab region show that many of the yearly extreme weather changes have been characteristic of the region for generations. We cannot attribute all extreme weather patterns automatically to global climate change.

Wisdom of nature

There has been no dangerous qualitative change in weather patterns in our region, besides the lack of rain that began a couple of years ago. In reality what has changed is people’s lifestyles and consumption patterns in general. In recent years, we have witnessed the repeated phenomenon of damaged crops due to frost, including the crops in plastic greenhouses. But if we look closely into the nature of frequently frost-damaged crops, we find, mainly, summer crops that are grown in winter. Summer crops are grown artificially during winter in greenhouses. Why, then, are so many of us surprised when summer crops that are grown in winter get damaged? Why are cucumbers and tomatoes grown artificially in the winter by using toxic chemical fertilizers, infected with disease, while cauliflower, cabbage and garlic are not affected—or at least only slightly—by frost? The wisdom of nature is embodied in providing cover for cauliflower, foliage layers for cabbage, and peel for garlic to shield them from frost. There are also grains that are extremely resistant to extreme cold and frost such as lentils, wheat, barley and others.

Instead of consuming grains, vegetables and seasonal fruits according to when they are in season, we are eating in the winter plants that are supposed to be grown in the summer. This consumption pattern is contrary to the laws of nature; some foods provide our bodies with specific kinds of energy, and these are precisely what we should eat in the winter. In this category of winter crops are grains, lentils, wheat, oats, spinach, peas, broad beans, chickpeas, cabbage, cauliflower, lettuce, and radish, in addition to citrus fruits such as oranges, grapefruit, pummello and lemon. Summer foods that should not be consumed in winter because of their artificial and untimely production include zucchini, eggplant, cucumbers and tomatoes.

Extreme weather conditions threaten local agriculture

Global warming causes extreme weather conditions in different parts of the world. Because of increased temperatures, Palestinian agriculture has suffered big losses, and it is expected these losses will continue. Watermelon, for instance, is very sensitive to heat; some farmers in the Jordan Valley and Jenin who still cultivate this crop have had to abandon their melon fields, and the melon that did survive the drought was of low quality. The internal temperature of a watermelon in a field with temperature of 40 degrees Celsius is 50 degrees Celsius, and it cannot grow.²⁶ High temperatures hurt fruit's fertility and pollination process as bees, wasps and insects that do pollination move less in warm climates. Damage has been apparent in the growth and quality of fruit.²⁷

Many farmers report that about half of their production was completely damaged or wiped out in the 2010 summer season.²⁸ Fruit that was ready for harvest also suffered because of changes in natural ripening conditions; drought and high temperatures cause fruits to mature early, reach only a small size and do not survive for long on the trees. This has a profound impact on marketing. For example, the majority of Hebron grapes were usually harvested in October and November, but in 2010, most of the harvest ended in mid-October, causing the price of grapes to increase significantly.²⁹ Other summer fruits such as apples, pears, peaches, plums, and apricots were badly damaged and saw increased prices; in the summer of 2010 there were almost no apricots in our local markets due to weather conditions.³⁰ Winter vegetables and fruit are also suffering from economic problems. Because of the dry 2010 winter season, the price of winter fruits and especially citrus prices rose to double what they were in 2009. Lettuce, for example, cannot stand high temperatures; in warmer climates it blooms early and the leaves are bitter.³¹ Fruits and vegetables in our local markets are the main victims of climate change, but livestock such

as poultry, sheep and cows have produced fewer eggs and milk of lower quality because of the hot climate.

We may be witnessing a direct relationship between global warming and damage to agriculture as extreme weather conditions become increasingly common. Some agriculture and food experts say that Palestinians in the occupied territories should be ready to face possible serious difficulties in accessing vital food products over the next two decades. Specialists refer to three possible factors in world food shortages that may lead to a significant rise in global food prices: rapid population growth, climate change that damages agriculture, and shrinking agricultural lands³². It is worrying that staple foods for the majority of Palestinians in the West Bank and the Gaza Strip are now imported from Israeli and foreign markets. Most grain, wheat, corn, barley and other foods are imported from abroad. Finally, rather than concentrating on strategic crops that could reduce Palestinian dependency on the occupation, local agriculture in the oPt has largely receded.



Sheep in the south of Hebron looking for food in land hit by drought.

26-Lobell et al., 2010, p. 63

27- Ibid

28- Afaq, issue 31, ibid

29- Ibid

30- Ibid

31-Ibid

32- Lobell et al., 2010, pp. 18-26

Methane gases and nitrogen trifluoride

In the midst of global discussions about carbon dioxide emissions and their impact on global warming, in recent times scientists have noted that some other gases actually have more devastating effects on the atmosphere than carbon dioxide. Recent research has shown that the concentrations of methane and nitrogen trifluoride in the atmosphere are much higher than previously believed. This means that the effects of these gases were not taken into consideration in calculating greenhouse gas concentrations. It should be noted that governments use these calculations to make decisions regarding the establishment of power stations and laws aimed at reducing greenhouse gas emissions from cars.

The effect of methane on global warming is approximately twenty times more powerful than that of carbon dioxide, which comes from human activity, the burning of fossil fuels, and so on.³³ Methane is emitted mainly from landfills, natural gas resources, coal mining, and damaged plants. Damaged plants are of grave concern as, millions of years ago, billions of tons of methane were produced from the decomposition of damaged plants that were buried under the ice in the Arctic. Currently, vast quantities of methane are retained under ice layers in the bottom of the Arctic Ocean. The concern is that the hotter these areas get, the larger the quantities of gas that will be released into the atmosphere. Scientists believe that this process will accelerate the heating of the planet, which in turn will cause further melting of the glaciers and even more methane to be released into the atmosphere. Recent scientific expeditions have been able to document for the first time the emission of this methane gas that had been trapped under Arctic ice since the Ice Age.

Nitrogen trifluoride gas is emitted during the production of items like flat screens, solar panels, and printed electronic circuits. For many years this gas was only considered to be a marginal problem as its concentration in the atmosphere was thought to be low. It has not been taken into account in various climate forecasts, despite the fact that nitrogen trifluoride's ability to absorb heat is more

than 17 thousand times that of carbon dioxide.³⁴ Recent research has revealed that the previous estimates were wrong and that concentrations of this gas in the air are in fact much higher. It has been found that the concentration of nitrogen trifluoride in the air has increased four-fold over the past ten years, and 30 times since 1978.³⁵ The use of flat-screen televisions and other electronic equipment is increasing from year to year due to higher global living standards, which means higher levels of this gas are emitted into the air, thus contributing to the global warming process. Some scientists are calling for increased attention on these gases that seriously affect climate change, and to include them in the scientific predictions given to relevant authorities.

Climate refugees

According to a 2007 IPCC (the Intergovernmental Panel on Climate Change of the United Nations) estimate, the number of environmental refugees is expected to reach 150 million people by the year 2050.³⁶ The growth of environmental refugees is already evident as a 2009 UN report says that twenty million people in the world were forced in 2008 to abandon their places of residence due to damage caused by natural disasters.³⁷ This report dealt solely with natural disasters (including damage to infrastructures caused by flooding and so on) and it was pointed out that this "modest" figure is actually four times the number of refugees from war and violent conflict. In all of these reports we find descriptions of drastic political, economic and health consequences resulting from increased numbers of refugees, including the social changes that will occur in countries that absorb refugees, outbreaks of various diseases, and epidemics that will worsen due to overcrowded refugee camps. This is in addition to the economic problems that will arise in trying to incorporate refugees into the labor force.

Climate experts estimate that the number of environmental refugees will reach tens and perhaps hundreds of millions. This is already occurring in some areas of the world, such as the Darfur region,

33- Richter, 2011, p. 24

34- Afaq, issue 19, ibid

35- Ibid

36- Boano et al., 2007

37- Afaq, issue 21

some parts of East Africa, and in the desertifying Sahel Strip which extends along Africa, Egypt could also face serious climatic plight; a sea-level rise of half a meter or more would turn more than half a million Egyptians of the Nile Delta population into environmental refugees.³⁸ The International Institute for Sustainable Development (IISD), reported that in Syria, about 160 Syrian villages were abandoned by their populations between 2007 and 2008 due to ongoing drought and water scarcity that the area had never before witnessed. Water scarcity in these villages located mostly in northern Syria forced residents to move elsewhere in order to survive.³⁹ The same report also noted that throughout the Middle East and specifically in Palestine, Lebanon, Syria and Jordan, longer periods of hot months and high temperatures will exacerbate the already growing water crisis. At the same time, the region's population is expected to double.⁴⁰

Palestine: sensitive climatic zone

While a raging debate about global warming and the factors leading to it is taking place, new research published in the scientific journal *Climatic Change* showed that the temperature average in Palestine has risen in recent decades almost twice as much as the global temperature has risen. Low levels of rainfall were also registered in most parts of the country, rendering Palestine drier.⁴¹ The research analyzed the measurement's data of the meteorological stations deployed in the country, in the period between 1970 and 2002. The statistical data showed on prominent trends and indicators, which were manifested in high temperatures in various parts of historic Palestine. The most significant warming was recorded in the central coastal area (Jaffa, Ramle and others) and in the Negev, where temperatures increased by one and a half degrees during the last three decades. This may seem like a slight rise, but compared with the global warming average in the last one hundred years that amounted to an increase of about 0.8 degrees, the rapid rise in temperature in Palestine is two times larger than the global warming

average.⁴² In the same period, moderate warming was recorded along the southern and the northern coasts (Asdod and Gaza) where there was a rise in temperature between half and three quarters of a degree. In contrast, there has been no decrease in temperature in any of the Palestinian regions.⁴³

Researchers have explained the more rapidly rising temperatures in Palestine by pointing out that the global warming average includes areas that have cooled in the last century. In addition, climate change does not occur in all regions of the world in the same way. As Palestine is located in a sensitive climatic zone, specifically between the desert climate and the semi-wet Mediterranean climate, it is more susceptible to rapid changes.⁴⁴

Researchers also studied precipitation levels. By merging temperature and rain data, researchers were able to calculate the drought index in Palestine, which is important in the context of climate research. Results were not encouraging; although precipitation levels on the Gazan and Israeli coast remained relatively constant between 1972 and 2002, we find that the rainfall levels decline seriously as we turn toward the east, that is, towards the occupied Palestinian territories. If we add the increased temperatures to this, we will find a big increase in the drought index, especially in the eastern and southern regions, which are areas characterized by their vulnerability to drought. With time, they have turned into increasingly dry areas⁴⁵. So with the exception of the coastal region, Palestine has become drier in recent decades.

38- Boano (ibid)

39- Afaq, issue 21, ibid

40- Ibid

41- Afaq, issue 24

42- Ibid

43- Ibid

44- Ibid

45- Ibid

Ignoring huge Israeli gaseous emissions

Enormous amounts of greenhouse gases emitted by Israeli military machinery and equipment are among the most dangerous factors of climate change in Palestine.



Israeli coal-based power plant in Hadera, near the city of Haifa. Photo by Ido Erez



In interpreting the disproportionate rise in temperatures in Palestine as compared with the rest of the world, it is crucial to also address the huge increase in Israeli emissions, particularly of carbon dioxide, in recent decades. These have directly affected the rise in temperatures and climate change in Palestine.

At a time when the world aspires to reduce emissions by at least 20% from its 1990 level before 2020, emissions in Israel will not decrease but are expected to grow by tens of percent until 2025. Israel continues to generate most of its electricity using old methods—especially the burning of coal—that endanger the Palestinian environment. The process of burning coal releases large amounts of pollutants that can cause serious disease and rising mortality in areas surrounding coal power plants. Coal-burning also causes warming rates to rise and thus accelerates the climatic changes taking place in Palestine. It is well known that coal is very detrimental to the environment and public health and greatly increases greenhouse gases in the atmosphere. Burning coal and changing it from a solid to a gaseous state makes it the most dangerous fossil fuel for humans, environment and climate. Israel's production of electricity, mainly based on the burning of coal, accounts for about 60% of total Israeli emissions from civil activities. It is expected that electricity consumption in Israel

will double before 2025, which, in turn, will double the amount of greenhouse gases emitted.⁴⁶

Although emissions from the region account for less than 1% of total greenhouse gas emissions in the world, Israel's share of this 1% is the largest. Israel emits 11.8 tons of greenhouse gas per capita per year, which is more than the per capita average in European countries (10.5 tons).⁴⁷ In contrast, the total Palestinian emissions of greenhouse gas and especially carbon dioxide in the West Bank and Gaza Strip were approximately 1.03 tons per capita per year.⁴⁸ In addition, Israeli military strikes, operations, and exercises have caused the emission of hundreds of millions of tons of carbon dioxide and other greenhouse gases. The amount of carbon dioxide emitted as a result of Israeli military activities is equivalent to the amount resulting from the millions of cars being driven on the streets of Palestine and in the Arab countries.⁴⁹

Starting from the Palestinian Al-Aqsa Intifada in 2000, through the July 2006 war against Lebanon, and ending with Operation Cast Lead of the winter 2008/2009 in the Gaza Strip, and including all the daily military operations and actions undertaken in the oPt in between, it is estimated that the Israeli military consumed billions of liters of fuel.⁵⁰ The amount of carbon dioxide resulting from the burning of this huge amount of fuel is worth tens of millions of tons. This without talking about the military activities carried out by Israel in the decades prior to the Al-Aqsa Intifada⁵¹.



Effects of scorched earth left behind by the Israeli army in the occupied Golan Heights.

46- "Yediot Ahronot", 23 March 2010

47- Ibid

48- Palestinian Central Bureau of Statistics, 2012

49- Heinrich Böll, *ibid*, p.64

50- Ibid

51- Ibid

Israel's unjust water system



Tubes and pumps re-routing Palestinian groundwater from Palestinian communities to Israeli cities and settlements.

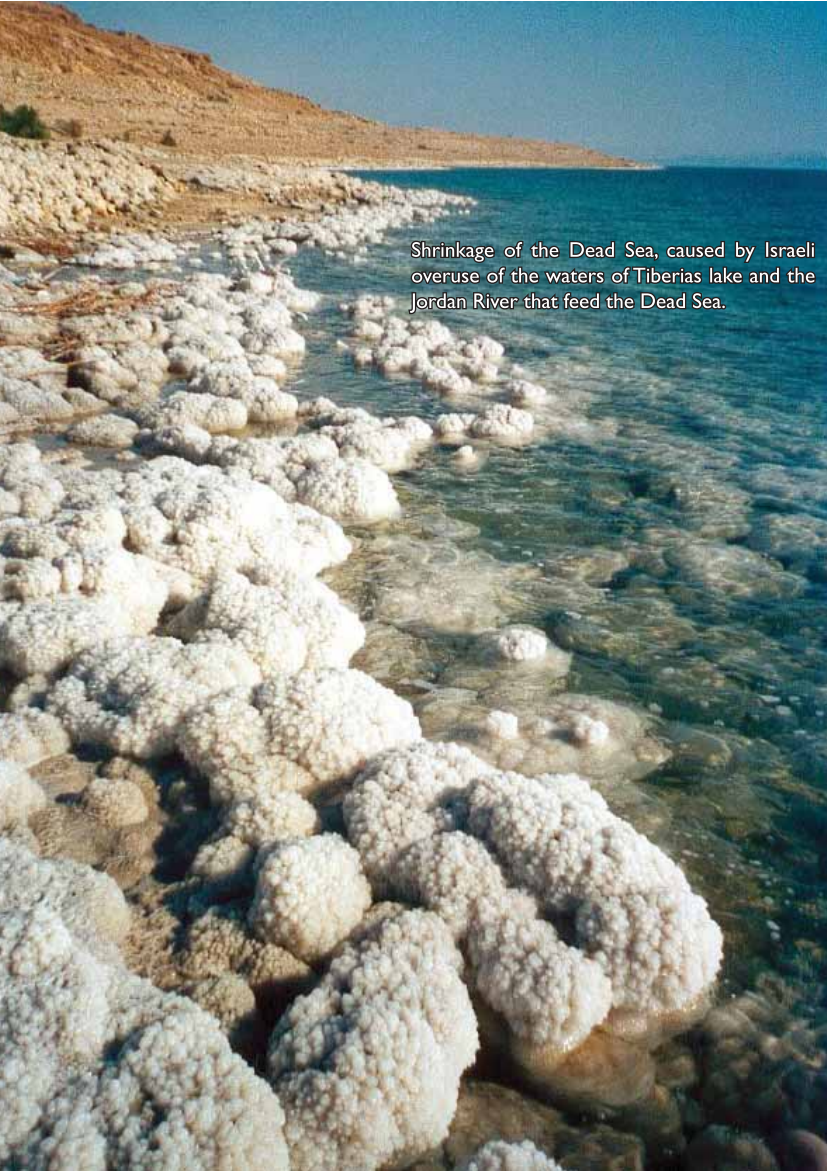
Rainfall levels in the middle Palestinian territories are of great importance as they constitute the main replenisher of water reserves in Palestine. This in contrast to the rain in the central and southern coastal areas (including the Gaza Strip), most of which flows to the sea or is lost in heavily built-up areas. Rainfall in the Jerusalem mountains and central areas of the West Bank replenish the western aquifer, which contains the largest water reserves that any “future Palestinian state” would depend upon. Israel does not allow Palestinians to drill any wells in the western basin; but allows drilling only in the eastern basin, which extends from the mountainous areas down to Jericho, and drilling in this basin requires 600 - 700 meters, which is very costly and the quality of water in this eastern basin is low, when compared with that of the western basin.

Israel practices a major re-routing operation through a long network of wells drilled specifically along the western basin—the richest of the Palestinian water basins—and extends along the middle areas from Zamareen (south of Haifa) in the north to Beersheba in the south. Rainwater in the mountains of the West Bank and Jerusalem mainly feeds this basin, and more than 500 Israeli wells extend along the borders of the West Bank, starting from Salem area in Jenin to the south of Qalqilya. The amount of water stolen from this basin covers one third of Israeli water consumption. These wells are part of the so-called Israeli national system that connects various water lines to each other. The route of the colonial wall was established specifically along this basin and accompanying wells that absorb its water. Water is also looted from the mountains of the West Bank as well as from Tiberias lake and linked to the same lines.

The crisis lies in that the excessive Israeli pumping of water from underground wells threatens the wells' existence. Excessive water pumping from coastal groundwater wells causes salination due to leakage of salty seawater. The seriousness of pumping water from mountainous groundwater wells to below the black line causes biological damage to the water and irreversible pollution. What makes the situation worse is the severe scarcity of natural water which depends on rainfall. Experts estimate that in the last eighteen years, water deficit reached to about 200 million cubic meters per year, meaning that, compared with the previous year, the amount of water was dropping, each year, by about two hundred million cubic meters.⁵² Global warming is considered as one of the most important reasons for the scarcity of rain. Scientists estimate that the water-poor countries



The Separation Wall has contributed to the destruction of the environment, green cover, and biodiversity in the West Bank.



Shrinkage of the Dead Sea, caused by Israeli overuse of the waters of Tiberias lake and the Jordan River that feed the Dead Sea.

will suffer particularly from drought, while water-rich countries will suffer from a surplus of water with large and sudden floods.

It is remarkable that Israel does not have sufficient amounts of water resources within the boundaries of 1948 Palestinian occupied land and relies on water sources outside these boundaries, specifically from the West Bank and the Jordan River basin. The estimated volume of water looted by Israel from sources outside the range of 1948 occupied land is about 1103 million cubic meters per year, of which about 453 million cubic meters comes from basins of the West Bank, and the rest, about 650 million cubic meters, comes from the Jordan River Basin. This amount is equivalent to approximately 57% of total Israeli consumption.⁵³ Currently, Israel is using about 80% (453 million cubic meters per year) of the groundwater in the West Bank, to cover about 25% of water use in Israel, leaving only 20% (118 million cubic meters per year) to meet all Palestinian water needs. Palestinians are deprived of their right to use their water wealth in the Jordan River, which they partially used prior to June 1967.⁵⁴

53- Ibid

54- Ibid

The estimated volume of water looted by Israel from sources outside the range of 1948 occupied land is about 1103 million cubic meters per year, of which about 453 million cubic meters comes from basins of the West Bank, and the rest, about 650 million cubic meters, comes from the Jordan River Basin. This amount is equivalent to approximately 57% of total Israeli consumption.



Water is a scarce resource in the Gaza Strip and residents must transport water in bottles and gallon containers.



As a result of the occupation, Palestinian children in Kfar Kadoum village (West Bank) must fill plastic containers with water from a reserve tank.

The Palestinian factor

Israeli military industries and activities in the West Bank and Gaza Strip as well as industries and power plants in Israel constitute the greatest threat to atmospheric pollution in Palestine, and they cannot be compared with the pollution caused by weak and fragile Palestinian industries. The Palestinian causes of air pollution are limited to quarries and stone crushers, some simple chemical industries, emissions from vehicles, an increasing consumption of energy, and the burning of solid waste in open lands near populated areas. In addition, there are some mining industries and bakeries that use automotive oil as fuel, and the pottery industry—mainly in the Hebron area—uses old tires as an energy source. Unspecified amounts of carbon monoxide and carbon dioxide are also emitted into the atmosphere from the coal industry in the Jenin area. Finally, some Palestinian individual and family practices pollute the air, such as the burning of tires and rubber for heating, and logging for the coal industry.

The level of air pollution in the Palestinian cities is getting worse in every governorate, increasing the

threats to public health. High population growth has meant increasing consumption of fossil energy and an increase in the number of vehicles on the street, which often use low-quality, dirty fuel. Dependence on older industrial systems that often lack air filtration systems means that gases are emitted into the atmosphere before toxic materials can be removed. This is in addition to increasing numbers of quarries and stone crushers, as well as an absence of developed “environmental” industrial areas. Tens of thousands of Palestinian vehicles that run daily on narrow and unkempt streets cause significant air pollution, especially because the West Bank and Gaza Strip lack a sophisticated system of streets within and between cities. In addition, traffic is not managed effectively and this leads to further emissions; congestion especially in the crowded centers of Palestinian cities exacerbates air pollution problems.

With an increasing number of Palestinian vehicles, especially diesel vehicles, air quality decreases further and further. Some Palestinian scientific sources estimate that gases emitted annually into the atmosphere of the West Bank, from vehicles of Israeli settlers and Palestinians, amount to more than 530 thousand tons of carbon dioxide, more than ten thousand tons of carbon monoxide, thousands of tons of sulfur and nitrogen oxides, and about seven thousand tons of volatile hydrocarbon compounds (except methane)⁵⁵. Although the number of Palestinian vehicles in the West Bank and Gaza Strip is small compared with the number of Israeli vehicles, about half of Palestinian cars were made in the eighties and nineties and the use of unleaded fuel is uncommon. Since the mid-nineties the number of cars in the West Bank and Gaza Strip have increased tremendously, and the current number of vehicles is estimated at 250,000. The efficiency of fuel combustion in old cars is less than in modern cars, which increases the emission of pollutants.⁵⁶



Palestinian youth working in a charcoal site near Ya'bad village (Jenin).



Poverty in Hebron leads some Palestinians to burn plastic waste to produce metals to sell. This burning site is in a nature reserve.

55- ARIJ, 2007, p. 134

56- Afaq, issue 4

Carbon footprint

Carbon footprint⁵⁷ is a scale to measure the area of land needed by an individual to live in a particular fashion. The measure aims at understanding the impact of our lifestyle on the planet and thus the effort that would be required to achieve a sustainable future. For the purposes of measuring the footprint, vital national data are gathered according to uniform and authorized standards. It may be the main tool for governments in their decisions and policy making. The ecological footprint is an urgently-needed tool, especially if we take into account the effects of increasing rates of resource consumption and rapid economic growth.

A carbon footprint is an indicator of sustainability that measures the use of natural resources by the population of a given state. In other words, "carbon footprint represents the demand side by humans for natural resources, while biological amplitude represents the supply side of those resources. The ideal situation requires that the biological amplitude be equal to the carbon footprint in order to maintain a balance, but when carbon footprint exceeds available biological amplitude it means that there is a deficit in natural resources of this state."⁵⁸ The Global Network of Environmental Footprint, an international non-profit organization, is engaged

57- World Bank, p. 38

58- Palestinian Central Bureau of Statistics, ibid











Intensive Israeli settlement expansion threatens the few remaining green areas in the occupied West Bank.

in calculating the environmental footprint of 150 countries, and it includes its findings in the Living Planet Report. In a world that seeks to develop itself environmentally, it is of great importance for states to accurately understand the environmental amplitude owned by them, how much is consumed from this amplitude, and consequently, how much they need to rebuild it. Therefore, cooperation between the state and the aforementioned network is crucial, starting with supporting and testing the footprint calculations of the State, and ending with using the footprint to support decision-making in the state. For example, if we want to express the seriousness of Israel's role in exacerbating gaseous emissions in the region, and thus its role in climate change, we can use the carbon footprint index (Table 3) to find that Israel has one of the largest carbon footprints in the world.

(Table no 3)

Carbon footprint according to states

State	Carbon footprint (dunum per capita)	Available surface (dunum per capita)	Environmental overdraft (dunum per capita)
Canada 	64	144	No-80 dunums per capita surplus
United States 	95	49	Yes-46 dunums per capita deficit
Holland 	47	8	Yes-39 dunums per capita deficit
Japan 	43	8	Yes-35 dunums per capita deficit
Egypt 	15	5	Yes-10 dunums per capita deficit
Israel 	53	4	Yes-49 dunums per capita deficit
China 	15	8	Yes-7 dunums per capita deficit
India 	8	4	Yes-4 dunums per capita deficit
Global average	22	18	Yes-4 dunums per capita deficit

Source: "Afaq al- Bee'a wa al-Tanmiya", no. 24

Knowing that the global carbon footprint average is 22 dunums per capita, then, we find that the United States stands at the top of this scale with a footprint of 95 dunums per capita, followed by Canada with 64 dunums per capita, and in the third place is Israel with 53 dunums per capita.⁵⁹ The United States has a deficit of 46 dunums per capita; Israel has a deficit of 49 dunums per capita, and thus has the largest global gap between what is used (carbon footprint) and what is available (biological amplitude).⁶⁰

In contrast, during the year 2012, carbon footprint in West Bank and Gaza Strip reached about 4.6 dunums per capita, while the biological amplitude in the same areas during the same year is 1.3 dunums per capita, bringing the deficit to 3.3 dunums⁶¹ (see Table 4).

(Table no 4)

Carbon footprint and deficit in resources – North America and Palestine*

	United States	Canada	Israel	West Bank and Gaza Strip
Carbon footprint (dunum / capita)	95	64	53	4.6
Deficit in natural resources (dunum / capita)	46	Surplus (80 dunums / capita)	49	3.3

* This table was derived from table no (3) in addition to numeric data mentioned in the previous last paragraph

59- Afaq, issue24, ibid

60- Ibid

61- WWF, 2012

Promoting the use of renewable energy

Arab countries are expected to be among the countries most affected by climate change. According to a United Nations report about Arab Human Development, the increase of carbon dioxide emissions in the region is one of the fastest growing rates in the world, and has nearly doubled in the period from 1990 to 2003.⁶² The city of Alexandria, Egypt, which overlooks the Mediterranean Sea and has a population of four million people, is in danger of submerging. The Arab Forum for Environment and Development says that a rise in sea level carries the risk of erasing six percent of the Egyptian gross domestic product, while United Nations studies show that submerging 4,500 square kilometers of agricultural land in the Nile Delta by floodwaters would cost \$35 billion.⁶³ It is known that the region is suitable for investment in solar and wind power because of the vast expanses of desert where sunlight is abundantly available. By 2020, Egypt is planning to meet 20% of its energy

needs with renewable sources.⁶⁴ “Masdar” company for renewable energy (in UAE) is planning to invest \$15 billion in renewable energy projects, including a carbon-free city in Abu Dhabi.⁶⁵ Despite these plans, the Arab countries in general are not making sufficient efforts to promote the use of renewable energy.

if we want to express the seriousness of Israel's role in exacerbating gaseous emissions in the region, and thus its role in climate change, we can use the carbon footprint index to find that Israel has one of the largest carbon footprints in the world.

62- United Nations Development Programme, 2009

63- Afaq, issue 25

64- Ibid

65- Ibid

Grading solar-energy efficiency

According to a scientific report that grades countries in the world according to their implementation of solar energy, Israel, which is considered one of the largest generators of emissions in the world, received a D- (hardly acceptable).⁶⁶ According to this classification, Israel is at the bottom of the scale in terms efficient use of solar energy. The irony that emerged from the report is that Germany, a country with little sunlight in comparison with the Middle East region, got the highest mark, and A- (excellent). Germany produces more than 14% of its electricity from solar sources.⁶⁷

For the second successive year, this report was prepared by two environmental organizations: Green Cross International and Global Green USA, and includes details about prospects of solar energy that can be utilized in each country, the financial incentives offered by different countries in the form of grants, loans and tax facilitations, as well as existing regulations that encourage or hinder the development of solar electricity. The gradation of different countries was made according to their efficiency in utilizing solar energy for the production of electricity, clean from pollutants and greenhouse gas emissions.

Solar energy meets the world's need for electricity

According to a comprehensive report published recently by the United Nations about the status of renewable energies in the world, renewable energy sources supplied 18% of the total electricity in the world in 2009.⁶⁸ For the second successive year, the increase in the production of energy from renewable sources surpassed increased energy from other sources such as coal, gas, and atomic energy. Dozens of countries decided to generate 15 - 25% of their electricity from renewable sources, until the year 2020. In Palestine and throughout the Arab countries, the great potential offered by solar energy is not harnessed, while Germany fully takes advantage of the relatively few possibilities for that energy. It is worth mentioning that the so-

lar energy that reaches the Earth in one hour can meet the global annual demand for energy. Clean solar energy technology can meet four times the global demand for electricity. However, solar power currently meets about 1% of global electricity consumption⁶⁹.

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66- (Green Cross, 2008)

67- Ibid

68- Afaq, issue 29

69- Ibid

The background is a collage of four grayscale images. The top-left image shows a woman with long dark hair. The top-right image shows a man with a beard and a headband, looking to the side. The bottom-left image shows a pair of white sneakers on a textured surface. The bottom-right image shows a person's legs wearing black leggings and white sneakers. Overlaid on the collage is the Arabic text 'النفط لا يُشرب' (Oil is not drunk) in the top-right quadrant and 'We Can't Breathe' in the bottom-right quadrant.

2

Policies and strategies

Climate scientists agree almost unanimously that the earth's temperature is rising. Their disagreement revolves around the magnitude and severity of this rise and whether humanity is the cause. In any case, since we cannot predict all the harm that gaseous emissions may have on climate patterns and people's lives, and as long as there is uncertainty, would it not be worthwhile to reduce greenhouse gas emissions that cause global warming to a minimum as a matter of caution? Ignoring the issue of greenhouse gas emissions could destabilize climatic balance locally, regionally and globally, and destroy the environment in which we live, harming public health and safety and threatening the existence of our economic and political systems.

It is clear that western industrialized countries, which consume more than three-quarters of global resources,⁷⁰ bear primary responsibility for the bulk of carbon emissions and thus have to work more to reduce these emissions. To accomplish this, residents of these states could individually and collectively influence their communities to play a key role in the process of protecting the global environment. But in the Global South we can also influence our societies towards defending and protecting our non-renewable resources and wealth which are currently exploited by American and Western transnational companies which are, in collaboration with local political re-

70- Ali, Patrik, 2008, p. 17

gimes and beneficiary social classes, working to protect their own consumer lifestyles.

If industrialized countries are to truly work towards mitigating global warming, they would need to undertake measure such as the abolition of subsidies for traditional (carbon) fuels, and the development of effective renewable energy technologies. The governments of these countries should impose on the industrial business sector work regulations and concrete steps to drastically reduce the global warming process. For example, they must increase the efficiency of cars and trucks, power plants, electric lamps, heating and air conditioning systems, and also increase the number of mileage per liter of fuel vehicles, which would greatly reduce the proportion of carbon dioxide emitted into the atmosphere. Moreover, the demand average for electricity can be reduced by about 40% through the use of energy efficient technologies that are currently available in the markets.

New, more stringent international standards should be developed to ration and decrease energy consumption and to increase the use of renewable energy. A new international agency must be created—or the mandate and powers of existing agencies should be expanded—to facilitate a rapid transition to renewable energy in the countries of the Global North and South alike.

Climate Conference in Durban (COP17): professional chatter, no achievement

In recent years, there have been many international conferences on climate change, which have not reached real influential agreements but have only led to procrastination and postponement of dangerous problems. The climate conference held in Durban, South Africa, in December 2011, is a striking example. Though a preliminary agreement was signed, it was agreed that a final agreement would not be signed until 2015 and would not enter into force until 2020. Obviously, we do not know the damage that may be incurred before that time, especially with regard to political and economic conditions that are likely to prevail in countries such



Climate Change Conference in Durban, South Africa, 2011.

as the United States, China, India and the European Union. Even if the final agreement is signed in 2015, it is unclear how serious its impact will be.

Durban decisions

We can say that the central decision of the Durban conference was to extend the Kyoto Protocol until 2017 (note that 2012 is the original expiry date), in addition to the decision to reach a binding agreement in 2015, which will enter into force in 2020. It was also decided that green climate fund worth one hundred billion dollars annually would be established. This would be funded by states and donors with the aim of helping developing countries to adapt to climate change and to switch toward the use of clean energy resources.

What is the importance of extending the Kyoto Protocol until 2017?

There is no real importance in extending the Protocol. Although the Kyoto Protocol was the last time the world's nations signed loose commitments to reduce their emissions of greenhouse gases, the protocol is no longer very influential in the realm of climate, as two of the three countries that emit the largest amounts of greenhouse gases (China and India) are not bound by reducing emissions, and the third country (the United States) was never signed onto the protocol in the first place.

Would signing a new agreement in 2015 be an achievement?

We can consider the agreement an achievement, but perhaps without saying that the agreement is "a distinctive new phase in the climate system" as was asserted by Christina Fagors, Head of the United Nations Mission in the conference.⁷¹ But it should certainly be acknowledged that if the United States, China, and India have agreed to sign a legally-binding agreement in 2015 that will enter into force in 2020, this is definitely a positive step. The real problem is that the agreement depends on many conditions like the need to provide political support for the agreement after four years. In addition, the general and vague text of the agreement may make the talks in 2015 difficult, assuming these talks take place to begin with.

To what extent would a 2015 convention be too general?

On the judicial side, the text of the agreement can be interpreted in many ways. The word "pro-

tol," which implies a more binding agreement, is not found at all in the text of the agreement. The agreement stipulates that it "must include all parties,"⁷² but this does not necessarily mean that China or India have equal status with the Europeans or the Americans in terms of the demands of the future Convention of 2015. This was a similar case for the Kyoto Protocol, since the protocol distinguishes between developing and developed countries and the varying demands of both groups. Another example of the potential agreement's futility is the use of the word "obligation"⁷³: intended to refer to the obligation to reduce emissions, the text is written so that it can be interpreted as relating to the obligation to transparency. These examples show that a future agreement may do very little in compelling states to actually commit to a reduction in emissions.

What is wrong with waiting until 2020?

As we know, the overall objective of these international negotiations is to reduce global warming in 2100 by more than two degrees Celsius than the global temperature that existed before the Industrial Revolution. So far, the Earth's temperature has risen by 0.7 degrees Celsius, since that point. Assuming that the world will work diligently to reduce greenhouse gas emissions in the coming years, an annual reduction in emissions by 0.7% will be required to reach the two-degree target. This is not easy, but also not impossible. It is equal reduction achieved by the European Union with its "cap and trade" mechanism. If we begin in the year 2020 to make the same efforts, intensely and more strictly, then we will be obliged to reduce total annual emissions by 3% in order to achieve the two-degree target. Of course, this effort would be much more difficult, and according to the "Stern" report, is very close to the upper limit of reductions that are not substantially detrimental to economic growth. In fact, there are currently real examples of economies that have succeeded in reducing emissions to this level and that have managed to remain prosperous at the same time.

72- Ibid

73- Ibid

71- Afaq, issue41

Enormous global subsidy for fossil fuel consumption

The International Energy Agency (IEA), which advises 28 industrialized nations on energy matters, said recently that global subsidies for fossil fuel consumption are expected to reach 660 billion dollars in 2020, i.e. 0.7% of global GDP, unless reforms are adopted to eliminate this kind of government subsidy.⁷⁴ According to excerpts of the IEA annual report on the energy in the world, "Governments and taxpayers spent nearly half a trillion dollars in 2011 to subsidize the production and consumption of fossil fuels. At a time of continued high prices, subsidy represents a significant economic burden."⁷⁵ The agency estimated 2010 subsidies were around 409 billion dollars, compared with \$312 billion in 2009.⁷⁶ Oil products received the greatest subsidy at \$193 billion in 2010 while the subsidy to natural gas reached \$91 billion. Iran and Saudi Arabia provided the largest subsidies.⁷⁷ The agency said that the end of subsidies for fossil fuels before 2020 would cut global energy demand by 4% and significantly reduce the growth of carbon emissions.⁷⁸

Israel is lagging behind in renewable energy use

Compared with other industrial countries, Israel is lagging behind in the use of renewable energies. While the country aims to produce 5% of its electricity from renewable energy by 2013, Israel currently generates only 0.3% of its electricity with solar power. So far, large projects for the harnessing of solar energy in the Negev desert have not been implemented. These projects are expected to provide the Israelis with 2.5% of the total consumption of electricity.⁷⁹

Nuclear power: the Israeli case

Japan's earthquake in 2011 showed that the nuclear industry can be dangerous and destructive to mankind, and that this industry continues to

mislead people about potential dangers to them. The question is: how many additional disasters must occur before we realize that nuclear reactors pose a significant and immediate threat to the health and safety of humans? Most environmental activists in the world consider Japan's earthquake to be conclusive proof that the nuclear industry is irresponsible and dangerous. Nuclear reactors are still a major threat to humanity; whether as a result of natural disaster, deliberate attack, or human technical error. In all cases, human and material costs and losses are far greater than the human capacity to endure such disasters. The natural and subsequent nuclear disaster in Japan are adequate proof of the need to abolish nuclear programs and give more attention to the security of the population and to achieve energy independence by investing in clean, renewable, and sustainable energy.

It is worth mentioning that the devastating consequences that may result from nuclear reactors have nothing to do with whether the reactors are civil or military; the four Japanese nuclear reactors that exploded after the earthquake were used for civilian purposes, specifically for electric power generation. In the cases of both civil and military nuclear reactors, the damages result from the same radiation leakage.

The use of nuclear power in Israel is controversial. On the political and strategic level, Israel is considered a military nuclear power. As long as Israel has not signed the international treaty to prevent the spread of nuclear weapons, it would be difficult for Israel to establish a civil nuclear power plant. The International Atomic Energy Agency (IAEA) will not support Israel in the fields of technology and funding and great pressure may be exerted on companies producing atomic reactors, to limit Israel's access to the necessary equipment before the country shows full transparency in all aspects of its nuclear capabilities.

In addition to the political dimension, there is an environmental dimension in the use of nuclear energy. The nuclear school has faced much oppositions around the world, especially after the 1986 Chernobyl disaster, which led to a significant slowdown in the construction of new nuclear reactors

74- IEA, 2011

75- Ibid

76- Ibid

77- Ibid

78- Ibid

79- Afaq, issue 29, ibid

around the world. However, there has been a renaissance in the field of nuclear energy in recent years especially because of many countries' desire to produce energy with minimal greenhouse gas emissions. Currently, there are 431 nuclear reactors in the world.

The main motive of those opposed to the establishment of nuclear reactors is their fear of a technical glitch and radiation leaks, as well as the problem of disposing of nuclear wastes. Opponents question the validity of allegations that a significant improvement in the safety and security has occurred in recent years on modern reactors, though advocates of nuclear reactors maintain that the Chernobyl reactor was first generation and reactors that are created today are of a much safer third generation and fourth-generation reactors are set to emerge in the near future. However, opponents of nuclear technology believe that when nuclear energy advocates speak about safe nuclear technology, they mislead the public because serious nuclear accidents that are hidden from the public actually continue to occur each year.

The most important fearful aspect in the Israeli nuclear activity lies in the fact that Palestine is small in size and therefore strategic consequences may result from any serious nuclear radioactive defect, from radioactive contaminating of groundwater basins due to leakage of radioactive materials to the dense spread of radioactive gases and particles in all parts of Palestine. Moreover, since Palestine is located in a seismically active geological area, a strong earthquake may destroy the nuclear reactors and lead to the leakage hazardous radioactive materials. Israel claims superiority in alternative energy technologies and promulgates this view in the Arab countries as it did in the Renewable Energy Conference held in Abu Dhabi in January 2010. Presumably, it should work first to reduce huge gas emissions resulting from its military activities and coal plants by investing in energy efficient and renewable energy projects rather than pursue nuclear capabilities that endanger the lives of millions.

Who bears the burden of solving the climate crisis?

Even though industrialized countries bear the primary responsibility to reduce global greenhouse emissions as they contribute to them most, this does not mean poor countries are not required to reduce their emissions. Rather, wasteful social classes in both industrialized and poor countries must take responsibility for their climate-devastating consumption habits. Interestingly, the rich minority in the world has left only a small and precious space in the atmosphere for the poor majority so that even if industrialized countries' emissions were to stop abruptly, developing states would still need to make the transition to non-carbon (i.e. renewable energy) economies.

Developing countries have a right to development, therefore poor, not rich, communities must be given urgent development priority. This may be accomplished using the concept of "development threshold," whereby individuals who fall below this threshold are not required to bear the burden of solving the climate problem.⁸⁰ The definition of "development threshold" should reflect the level

80- Baer et al., 2007



Aerial view of the Israeli military atomic complex in Dimona, a site of intensive military nuclear production hidden from international monitoring.

of well being which is above meeting basic needs but also remains under the current levels of consumption exhibited by the rich.⁸¹ Development for these people, who have a limited ability to invest in solving the climate problem, is a first-class priority. On the other hand, individuals above the development threshold are viewed as having realized their right to development and thus bear the responsibility to preserve that right for others. They are also supposed to facilitate the pursuit of a low-emission sustainable development path for those below the threshold, while limiting their own consumption.⁸²

Some experts estimate the development threshold to be around \$ 9,000 per person per year (or \$ 750 per month). Although this figure is debatable, it reflects a reasonable level at which an individual is able to largely overcome destitution and poverty and to become a member of the consumer class.⁸³

In the contemporary world, the common path from poverty to prosperity generally involves a significant increase in per capita consumption of fossil fuel energy and other non-renewable resources. This specific energy-consuming transition must be addressed. Fifteen percent of the world's population currently living in about forty high income countries use about half the world's energy, thus producing about half the amount of global carbon dioxide, and consume about half of global goods and services.⁸⁴ It is no surprise that the poor, quite simply, have no "environmental space" to develop in the same manner used by the rich.

The fundamental question is: what climate system would allow for a rapid decline in emissions and simultaneously provide people of the Global South with the opportunity to overcome poverty? Under a global emergency system to combat climate change, severe restrictions on economic activity that causes carbon emissions would have to be imposed. In the absence of serious efforts to

find a low-emission development path, the poor would be limited in and maybe even deprived of their right to development. A global climate regime with any promise of success must explicitly embrace the right to sustainable human development and to relative security and wellbeing. The challenge lies in ensuring the right to such development in a manner that properly links it with an emergency drive to rapidly de-carbonize the entire global economy. One way of achieving this could involve determining a certain share of the gross world product, perhaps 1 to 3%, to be invested to support a Global South transition to a low-emissions economy.⁸⁵ This figure is not huge, and the sum is well worth it if sustainable development is to be achieved.

Negotiators of the Global South will insist—with strong ethical and political justification—that their priority must be to eradicate poverty and not just mitigate greenhouse gas emissions. They will assert this despite strong and growing evidence that even globally non-catastrophic climate changes will still cause immense damages on the local level that may undermine many of the development gains that poor communities have thus far managed to achieve. A global emergency system, like the one mentioned above, would also require far-reaching changes in agricultural practices and land use, which currently account for as much as one third of southern greenhouse gas emissions. We can conclude that the North cannot stabilize the climate without the full commitment of the South, and the South cannot make that commitment if doing so would threaten to undermine its development. This means that a global alliance to stabilize the climate can only arise and survive on terms that honor the Global South's right to sustainable human development.

Complementing the desired developmental panel, a fair tax system must be established that imposes lower taxes on the poor or even exempts them from taxes. As the poor spend most of their income on necessities rather than luxuries, reducing their taxes will allow them to afford those necessities. In other words, the consumption of the poor is a greater moral priority than the consumption

81- Ibid

82- Ibid

83- Ibid

84- Ibid

85- Ibid.

of the rich. This also applies to the states; if a country's GDP lies below the development threshold, it is likely to be paying for necessities that contribute directly to subsistence and development, rather than for luxuries.

From this "right to development" perspective, are all emissions created equal? Should we count "survival" and "luxury" emissions in the same way? Should CO₂ emissions from cooking and heating, or methane emissions from subsistence rice agriculture (rice is considered the staple food for many of the peoples of the Global South) be treated the same way as CO₂ from jet travel or CFCs from air conditioners? We argue that they should not be, that these different types of emissions are of a fundamentally different nature. The recognition of this difference is critical to any burden-sharing framework designed to protect the right to development.



Environmental activists in Beirut calling on Arab leaders to act to confront climate change in Arab countries.

The vast economic disparities within nations imply that responsibility must be conceived in a manner that recognizes the right to development as a right of individuals, not a right of countries. Even poor countries with overall low per capita levels of consumption and emissions have some residents who are members of the high emitting consuming class. These emissions must be counted toward the country's obligations to limit emissions. So, no national obligations should arise from the economic activities of individuals at low levels of develop-

ment. Only when people cross the development threshold and enter the consuming class should their activities affect the obligations of the nation in which they live.

Based on this information, we can use the following hypothesis: within any given country, emissions are proportional to consumption, which are in turn proportional to income.⁸⁶ However, responsibility is not necessarily higher in wealthy countries and near zero in the poorest countries. There are also important differences among countries with similar incomes. Some wealthy countries have much lower emissions than others. This applies, for example, to Japan and the United Kingdom, which have much lower emissions than the United States. On the other hand Russia, as a developing country, has much lower emissions than Mexico, for example.⁸⁷ In determining a share of global GDP to invest in sustainable development in the Global South, countries should contribute based on how much they consume and emit. Military budgets can be a useful way to identify countries that pollute the most and that should perhaps contribute more and significantly reduce their emissions. For example, the US military budget is no less than \$500 billion a year, which is as much as a third of the total US federal budget. The United Kingdom's official military budget is about \$51 billion a year, while China's is estimated at \$188 billion and India's at \$114 billion.⁸⁸ Mechanisms for generating payments for sustainable development include various fees, carbon taxes and progressive income and/or consumption taxes.

Economy based on renewable energy

Economies based on fossil energy (oil, coal and natural gas) rely on a limited and non-renewable energy stock. Based on the current global consumption levels of energy, the global reserves of oil, which currently hold about 40% the global en-

86- Ibid.

87- Ibid.

88-Ibid.

ergy demand, would dry up in the coming decades.⁸⁹ This situation will increase global economic crisis with huge rises in oil prices. But in order to alleviate expected economic, social and political crises and tensions in the industrialized countries, these countries could launch wars to protect their non-renewable energy sources, the bulk of which are located in the Global South. The war in Iraq that was launched under the pretense of human rights and democracy and that led to the subsequent fragmentation of the country is only one blatant example that has already taken place. For this, the “new strategy” of the North Atlantic Treaty of 1999 already confirmed that its new mission will be to “secure access to [energy] sources at the global level.”⁹⁰ Current non-renewable traditional energy reserves are located in certain limited spots of the world, but consumption of this energy is not centered and is diffused to every corner of the Earth. However, control over these reserves is concentrated in the hands of a few companies that operate constantly to increase concentration and monopoly, often under the guise of “globalization.” Furthermore, emissions from carbon conventional energy consumption may cause global environmental crisis, which may in turn cause economic collapse.

Historical, developmental and environmental factors, and the fact that most of the Global South lacks access to non-renewable energy sources, require the use of alternatives to traditional fossil fuels. These alternative resources may include solar, hydro, wind and organic power. It is enough to know that the magnitude of potential energies in renewable raw resources dramatically exceeds the magnitude of potential energies available in non-renewable resources. For example, the magnitude of the energy transmitted by the sun to the Earth is estimated to be more than 15,000 times the annual global consumption of conventional fossil energy and nuclear energy put together.⁹¹ So, it would be possible to replace all fossil energy sources with solar sources, which are inexhaustible as long as the solar system ex-

ists. Most importantly, when solar energy is converted into energy or secondary material in the form of fuel, heat, or electricity, no emissions dangerous to the environment are produced. In addition, solar power exists all over the world, it can be used on a local basis, and it is non-centralized and cannot be subject to the monopoly characteristic of non-renewable energy sources. All that is needed is a suitable simple conversion technology for domestic use.

Since renewable energy sources are not centralized, we can invest in a large number of small conversion projects and dispense with large projects. It would also be possible to rehabilitate the farming and agriculture economy, and increasing the interest in it as an important source for the production of raw materials for industry. We can also get rid of dependency on means of energy transport and distribution for long distances and replace them with local means. In sum, we can reconnect the conversion of primary resources into energy with the consumption of that energy and be liberated from an economy based on non-renewable resources and the global capitalist monopolies that dominate them. This will provide various communities and peoples with more opportunities for socially equitable and environmentally sustainable economic development.

A global economy based on renewable energy, and especially solar energy, could have profound implications for the wellbeing of people across the globe. Without a reliance on centralized energy (as is the case with fossil fuels), pressure on the current growing mega-cities may be eased as people no longer need to rely on a city’s centralized energy grid system. It may be difficult for transnational monopolistic corporations to survive in an economy based mainly on solar energy, as it may not be possible or desirable to centralize resources and capital. As energy from the sun cannot be privatized or monopolized, it will be increasingly possible to pursue an egalitarian society where communities across the globe have equal access to the energy they need.

89- Ali, Patrik, 2008, *ibid*

90- *Ibid*.

91- Kurzom, Switching to the economy based on renewable resources, 2004

Liberation from dependence on external inputs

Most of the few renewable energy projects in the West Bank and Gaza Strip are predominantly funded by international financing institutions. One of the most important reasons for the reluctance of the private sector to invest in renewable energy is the lack of an appropriate investment environment as the private sector invests only in economically feasible and profitable projects. Because the volume of renewable energy projects in the West Bank and Gaza Strip is small, the construction cost of these projects is high, which does not stimulate the private sector to invest in them. Investment in this area requires banking and government facilities, tax cuts and exemptions, and enacting laws that restrict the production of environmental pollutants, not to mention the conclusion of cooperation agreements with Arab countries that want to invest in alternative and renewable energy. The lack of these things increases the reluctance of the private sector from investment. Overall, it is assumed that the government sector should shoulder the primary responsibility to take the initiative to create and develop alternative energy projects.

From a strategic developmental perspective, investing in environmentally sustainable productive agricultural, industrial, and service projects, which minimize dependency and which enhance self-reliance, is much better than clinging to prevailing economic assumptions and policies of many Palestinian economists and development workers. These policies have distorted and continue to distort the Palestinian economy and are consolidating and deepening the process of annexing it to the Israeli economy.

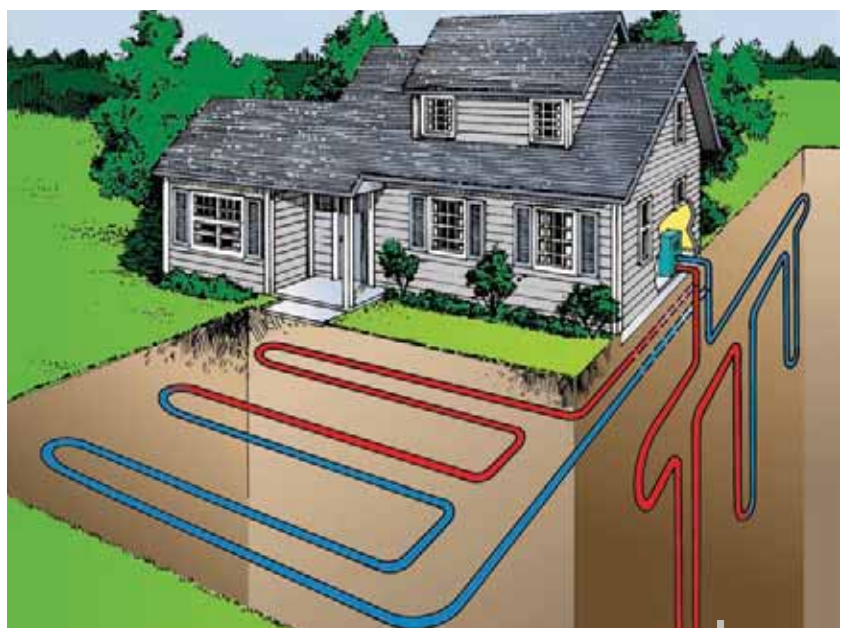
Investment opportunities in renewable energy

Many climate experts support the need for rapid and effective reduction of carbon gases, especially carbon dioxide, which accounts for about 63% of these gases. The reduction could be achieved through the use of clean fuels instead of fossil fu-

els, and by increasing the use of clean energy such as solar, wind, and water to produce a clean fuel alternative to oil, coal, and natural gas. (Note that the rate of use of clean energy does not exceed 3% of the total energy forms currently used in the world.)

Creating an infrastructure for the production of electricity by solar energy, and investing in infrastructure for public transport and recycling, will require financial investment. In the Arab countries, we can increase the use of solar energy to produce electricity as the most important way to reduce emissions.

Actions that will not require investment include increasing energy efficiency, such as the utilization of wastes to produce electricity, improving residential buildings to match green building specifications, and changing the proportions of fuels in the energy market. These actions may lead to a reduction of carbon dioxide by tens of millions of tons, a reduction that is roughly equivalent to savings resulting from investment in renewable energy. At the Arab level, we can reduce greenhouse gases by tens of millions of tons by changing our behavior patterns. The changes we are advocating include rationing and reducing the consumption of energy and water in homes, reducing the consumption of beef, raising the temperature of air conditioners, and making greater use of bicycles instead of cars.



A heating and cooling system powered by geothermal energy.

Buildings are the most important sources of greenhouse gas emissions

Buildings are, in general, the main sources of greenhouse gas. Data show that the cause of nearly three-quarters of emissions in cities is the energy consumption in different buildings, be they industrial, commercial, public buildings, or homes. So, many climate experts recommend considering the establishment of green buildings to increase energy efficiency as a top priority in policy planning for governments and local authorities. With regard to air pollutants, public and private transportation is the main source of emissions. In the West Bank and Gaza Strip, transportation contributes to more than 80% of air pollution.⁹² From here stems the importance of developing and disseminating public transport networks between and within cities. Emissions in Palestinian cities have significantly increased in the last ten years due to the large increase in population and vehicles.

It is clear that the Palestinian authorities should start to prepare a detailed national plan for the implementation of green buildings and an increase in the efficiency of energy, transportation, fuel, waste

recycling, and the use of open and green spaces in cities. Of course, this is a long-term approach in which large municipalities should undertake the task of reducing greenhouse gas emissions and air pollutants in their areas of influence. This requires the establishment of an accurate and comprehensive database that will help to shape and develop detailed programs that enable us to reduce emissions and air pollution resulting from the wasteful use of electricity in buildings, and from transportation and wastes produced by the city.

Green building and economic incentives

Research shows that the construction of green buildings raises the initial cost of a building by about 5% -10%,⁹³ but in a span of ten years the green building actually recuperates the initial investment in addition to the obvious benefits of saving natural resources and reducing emission of greenhouse gases and other pollutants. To lessen homeowners' doubts, the awareness level of those involved in the construction of green buildings (initiators, planners, project managers, implementation contractors, building materials' producers



Green house

and those who live in the buildings) must be raised and confidence strengthened. Green building does not only imply financial savings and benefits to the environment but also requires more serious planning and stronger cooperation between all those involved in the construction process.

Since abiding by green-building specifications is voluntary and non-binding, several incentives must be provided to support energy-efficient systems. This may include economic incentives such as tax cuts on green goods, subsidies and soft loans for the construction of green buildings. The private sector is also able to provide incentives such as deductions in the insurance fees for green buildings, and preference in housing loans can be given for green buildings.

Environmental building designs

Many countries follow the international environmental specifications for environmental building, known as LEED specifications (U.S.), which are considered to be relatively strict environmental architectural guidelines. Buildings may be classified into four grades: bronze, silver, gold and platinum, according to the reduction of energy consumption. For example, covering the roof of the building with soil and planting it with local shrubs; thus transforming the roof into a beautiful orchard, which makes the temperature of the building drop a few degrees in summer. The building design also encourages increased efficiency of air conditioners; instead of emitting hot air outward, it is directed into the ground, thus saving about 30% of the electricity needed to run them.⁹⁴

The building is designed to use natural light during the day so that no electricity is required. This reduces lighting costs by about 20%.⁹⁵ In addition, the wastewater generated from the building is recycled through a special purification facility so that treated water is used to irrigate the gardens surrounding the house; there is also well for rainwater harvesting. The remnants of grass and trees that were eliminated during the construction process are used for composting and already-existing distinctive trees around the construction site are preserved.

94- Ibid.

95- Ibid.

Saving large amounts

In recent decades, thousands of buildings have been built in the West Bank and Gaza Strip with no regard for the specifications of green construction and thermal insulation. Many avoid providing buildings with qualitative environmental thermal insulation and claim that it is expensive. It is true that thermal insulation increases the cost of construction by about six percent, but recovery of this cost takes no more than one year. So if the concerned parties think in a "macro thermal" way, then the 1967 Occupied Palestinian Territory may economize millions of Israeli shekels and also contribute to a serious reduction of greenhouse gas emissions.

Many countries have specified regulations for green building that are obligatory for all citizens. In Turkey, for example, the law states that all those who wish to repair a particular building or a house should get formal approval which involves an improvement the energy situation in the building.

It is time, therefore, to restrict the construction or renovation of hundreds of buildings that does not include any consideration for thermal insulation and energy efficiency. According to energy experts, thermal insulation in autonomous Palestinian areas could save tens of millions of dollars a year. Relevant government agencies should begin dealing with green building as a national issue that affects the Palestinian entity and not just the individual citizen. Currently, most of the buildings in Palestinian cities, villages, and refugee camps were built without thermal insulation and in accordance with old specifications that date back to the fifties and sixties which mean high electricity bills. And because of a lack of obligatory thermal insulation in the Occupied Palestinian Territories; many citizens run air conditioners and heaters in the summer and winter without stopping.

The overall commitment to thermal insulation will, to a large extent, reduce greenhouse gas emissions. Policies that contribute to the reduction of greenhouse gas emissions in the field of green building must be developed. At the level of the economy or the budget, the cost and turnout related to the means of policy implementation of the development of green buildings including tax facilities, incentives and regulations, must be studied.

Return on investment (ROI) in green buildings

Most people view buildings as inanimate, silent objects that exist to serve their residents. Not many people realize that these inanimate structures are responsible for the emission of about 40% of greenhouse gases in the world and about 25-40% of the world's energy consumption.⁹⁶ The energy consumption in many old and new buildings is much higher than actually required for the performance of building functions. In the United States, for example, experts estimate that about 30% of the energy consumed in buildings could be saved.⁹⁷ Bad planning and design, the use of old technologies, and the wasteful use of existing systems in buildings are among the most important factors leading to excessive energy consumption.

Energy consumption in buildings is determined based on variables such as the size of the building, the way it was constructed, building materials, methods of construction, heating systems, ventilation and cooling (HVAC), water heating systems, renewable energy systems (solar or wind for example) and lighting systems. For the optimal uti-

lization of energy, it is necessary to carry out an assessment of the functions and performance of the overall systems in the building starting in the early stages of design. Good design improves the performance of the various systems in the building and reduces the property owner's total expenditures. Even though this is clear, a full improvement process of energy efficiency was conducted in only a few buildings in the West Bank and Gaza Strip. One central obstacle was the lack of appropriate regulations that stimulate investment in green construction. A second obstacle was the fear of investors in the design phase due to perceived weaknesses in the energy system. However, because of recent technological advances and updates, there is little reason to fear an inefficient energy system. Currently, we can access optimal energy efficiency through the use of computerized simulation programs. Design and development teams can use these programs to calculate the expected amount of annual energy consumption in the building and therefore make conscious choices in the construction or rehabilitation of buildings. The investment in the green rehabilitation and design of buildings is expected to be recovered over a period of only three years because of the expected 40% annual savings in energy consumption.⁹⁸



Example of a typical environmentally-friendly and energy-saving home.

Is a “green economy” possible under occupation?⁹⁹

In recent years, global debate has raged over what is known as “green growth” or “green economy.” “Growth” in the dominant economic sense actually implies harming the environment as industry requires an infrastructure, energy, water and uses many natural resources. The newer concept of a “green economy” looks for ways to delink this “growth” from the implied destruction of the environment. While economic growth is important, the true concern is the quality of people’s lives. Economic growth that leads to the destruction of natural resources does not contribute to improving the quality of life. From here stems the importance of adopting the concept of “green growth,” which takes into consideration people’s health and the environment. Some green economy experts estimate that implementing a “green economy” may actually generate additional annual growth of between five and ten percent.

Embodiment of green economy in the Palestinian context

How can we pursue such a green economy? It should first be emphasized that “green growth” is not a project to change the environment but to change the economy. Traditional economic indicators fail to give us an honest description of the quality of life and needs of the majority of the population. Governments have a central role to play in pursuing green and efficient economies through necessary changes in legislation and policies, as well as a large investment of public funds in programs aimed at improving the quality of life of citizens and ensuring their wellbeing. This means pursuing green agriculture that does not destroy natural resources and that encourages a return to small-scale agricultural holdings. There must also be an annual investment in the forest sector, which is an essential component in the fight against cli-

mate change, and also to improve water systems and to treat wastewater with a special focus on recycling and purification plants.

Small Palestinian agricultural holdings are not the problem as green and self-reliant agriculture encourages, as we mentioned, a return to small-scale holdings. Our problem lies in our lack of a national productive policy that depends on local production inputs and that encourages agriculture to meet local needs. If this were achieved we would no longer need to search for salvation from abroad.

New growth engines



Windmill and solar cells are a source of electricity in the home of Nabil Sghayar in Hebron.

Green development trends that produce new growth engines should significantly increase employment opportunities and encourage agricultural production based mainly on local production inputs such as local and indigenous seeds, organic fertilizers and pesticides, and so on. This is in addition to motivating and encouraging existing industries to shift to cleaner production processes, the establishment and development of new green industries, and the creation of new markets for green local goods, particularly agricultural and food commodities.

99- This section dealing with «green economy» under the Israeli occupation, is taken from an earlier paper I prepared for «the Palestinian NGO Network» in April 2012 entitled «Towards a Palestinian green economy»; the paper was incorporated in the Network paper presented in the Global «Rio 20 +» conference (June 2012). See also: Climate Works Foundation, 2010



Solar power provides Bedouin tents with light in the east of Yatta - Hebron district.

In order to design Palestinian economic policies and strategies which are in harmony with a green economy, key players in the economy must, as a first step, meet at a roundtable and work towards developing a detailed concepts document which would turn good ideas into an organized action plan.

As a result of adopting and implementing green-economy policies and mechanisms, we can expect an increase in the financial value of Palestinian GDP by tens of millions of dollars, as well as saving additional tens of millions of dollars that are currently being used to confront health and environmental problems. In addition, thousands of new jobs can be created in the area of waste management alone. And in recycling waste, we can rehabilitate the raw materials worth hundreds of millions of shekels that are currently disposed of and buried in landfills. Recent research has showed that recycling dry solid waste (metal, glass, plastic, paper and cardboard, etc.) is economically feasible and provides green jobs that currently do not exist in the process of dumping in the landfill. Waste recycling is labor-intensive and contributes to raising GDP, and can also provide jobs to each local community. Compared with the burial of dry waste in landfills, dry waste recycling may increase the proportion of employment by more than 40%-50%.¹⁰⁰ For example, burying a thousand tons of dry waste (met-

als, plastics, glass, and paper) generates about 17 jobs, whereas recycling a similar amount of waste provides about 25 jobs-an increase of 47%.¹⁰¹ The process of collecting and processing an important part of dry solid wastes is flourishing in different parts of the West Bank, though their percentage does not exceed 30%-40% of total solid waste.¹⁰²

Green economy - economy of resistance

In the Palestinian context, the philosophy of green economy is compatible with strengthening the popular national agricultural and industrial productive structure. This ideal structure is characterized by productive diversity, is centered on the local market, and meets the basic needs of the people to achieve food security and wellbeing. The system would be based on local production inputs and would thus free Palestinians from dependence on foreign production inputs. There would be a focus on limiting consumption and on buying local, seasonal food products that have been produced from natural ingredients with minimal processing, that have not traveled long distances, and that contain a minimum of reusable and recyclable packaging. The commitment to this kind of production costs less, reduces transportation expenses, keeps money inside the country, enhances local commerce, maintains local resources, reduces environmental and health pollution, and contributes to the reduction of energy consumption. All of this is compatible with the Palestinian economy of steadfastness and resistance.



3

Applications

One:

Green building

What is Green building?

Though there has been a recent increase in discussion regarding the establishment of Palestinian green buildings, no serious work has been undertaken to develop preliminary standards that are consistent with international guidelines and that are also compatible with the Palestinian climate and local building methods. Environmental experts in institutions such as the Palestinian Standards and Metrology Institution, the Palestinian Ministry of Environmental Affairs, the Ministry of Health, the Engineers' Trade Union, as well as experts at universities, NGOs, city planners and other professions should work to develop standards.

The following are basic principles guiding the green building process:

First: to minimize negative effects on the environment

This means reducing consumption of resources and minimizing the negative impacts of construction on the environment. We can apply this principle in many ways, including: selection of land that has low environmental value, preserving open spaces through the maximum utilization of internal space, reducing energy consumption for heating and cooling with building insulation, and designing each building in accordance with the climatic conditions of the site. It is also important to construct the building with recycled or biodegradable materials and to use water-saving techniques and methods for waste separation and so on.

Second: a healthier life

The construction process must improve the health and wellbeing of the building's residents. This can be ensured through: an emphasis on selecting building materials that do not contain toxins, the planning doorways and windows to ensure natural ventilation, good exchange of air, and a maximum level of natural lighting. In addition, the use of plants can create a comfortable local mini-climate in the area of the building.

Example of a green building.



Third: changing behavior patterns

This includes construction considerations that aim at changing the habits of the building's residents to reduce their negative impact on the environment and to improve their own health. For example, providing storage for bikes in office buildings in order to encourage the employees to bike to work. This will also require the construction of bike lanes on roads to encourage the use of bicycles instead of cars. Other examples include planning the interior space of the building to make it easier for residents to separate household waste for recycling, and planning transportation at the district level so as to encourage the use of public transportation.

Fourth: positive impact on the environment

The fourth principle concerns environmental protection and maximizing natural resources. This could be accomplished through the use of renewable energy production technologies and by reducing the need to produce energy from non-renewable and contaminated sources. In addition, the planting of native plants will contribute to the increase in the diversity of local plant species in the context of local building space.

Few buildings currently abide by green building requirements. One reason for this is low awareness among planners and other professionals associated with architecture, another is the additional cost resulting from the application of new technologies that raise the cost of construction. As illustrated above, the construction methods of the building itself do not alone indicate whether or not the building is green. Planning the space surrounding the building is also important, and together both aspects are part of a sustainable lifestyle. Green construction is a "complete package" according to which residents protect the environment, enjoy low-cost living and a healthier life. According to estimates, the expected economic savings for a Palestinian family living in a medium apartment consisting of four rooms and built according to green building specifications is up to thousands of dollars annually. Green building is a better housing option in terms of health, the environment, and economics.

As buildings consume about 60% of energy consumed locally and produce about a third of greenhouse gases, this is an area that has a huge global environmental impact.¹⁰³ In our modern lifestyle, individuals spend about 90% of their lives between four walls. The separation from natural air and light and the presence of toxic chemicals found in conventional building practices have a direct impact on health.¹⁰⁴ The importance of green building should be brought to the attention of officials, many of whom still believe in myths portray green building either as a return to life in caves or a luxury only the rich can afford.

Plants on the roof: a key component of green building

Most of the roofs of buildings in the West Bank and the Gaza Strip are usually neglected, little-used spaces. They are often used for solar panels, antennas, or maybe as storage for worn wires and pipes, old furniture and other household wastes. The roofs of public buildings and schools are generally worse, except in rare cases where the school decides to turn its roof into a green grove.

Currently, the practice of farming—primarily vegetables and herbs—on rooftops is spreading in many homes in the besieged Gaza Strip. The people of Gaza have a clear motive for planting on the roofs with the reality of the blockade. This is a clear example of the strong common denominator between the economy of resistance and the protection of the environment. In fact, a green roof is an important component of green building; a rooftop covered with vegetation that has on its bottom a thick insulating layer protects the upper floors from the heat and also reduces the heat inside the building by three or four degrees at the height of scorching summer months, which allows for reducing the use of air conditioners and energy consumption. Turning the roof into a garden also attracts birds and butterflies and in this sense, the green roof "restores" to nature the lost plot on which the concrete building was built. There is also an aesthetic dimension as the green roof is

¹⁰³- Richter (ibid)

¹⁰⁴- Ibid.

the fifth facade of the building and can be seen from nearby buildings. A greenhouse can also be established on the rooftop to serve as a plant nursery and thermal insulator at the same time. In the summer, the greenhouse can be used as structural support for climbing plants.



Gazan citizen tends to vegetable seedlings on the roof of his house.

Gazan citizen tends to vegetable seedlings on the roof of his house.

Turning homes into green buildings

Many of those who are interested in buying an apartment or building a new home face numerous proposals for “green building.” In recent years, there has been an increased number of companies advertising apartments and homes with various “green” features. Many companies have also taken advantage of the “green” trend to advertise environmentally-friendly building materials and home appliances. But what are the renovations, repairs, and improvements required to transform an existing home into a greener, more energy-efficient home? Before answering this question, it is useful to note that more than 70% of greenhouse gas emissions from Palestine and other Arab countries come from existing buildings and their inhabitants.¹⁰⁵ So, besides encouraging the construction of green buildings, major work should also be done towards “greening” the existing buildings.

One simple renovation that can be undertaken to convert an old building into an energy-saving one

is to isolate the exterior walls, windows and openings, to change windows and replace them with others that match the accredited environmental specifications, in addition to setting up umbrellas and green roofs. The time needed to recover the cost of investing in “greening” a house is short, as the expected savings in electricity consumption, cooling, heating, and lighting, are around 25% or more annually.¹⁰⁶ Green buildings save enormous sums spent on electricity consumption as households, through their consumption of electricity, contribute to the generation of more than 40% of global greenhouse gas emissions.¹⁰⁷ If we reduce household electricity consumption by 15-20%, the result will be a reduction of about 10% of the local emissions of greenhouse gases.¹⁰⁸

Two:

Energy Consumption and Energy Production Systems

Energy-saving lamps

At a time where much talk is taking place about the need to ration electricity to reduce greenhouse gas emissions, much attention is concentrated on large household appliances such as air -conditioning, washing machines, and clothes dryers. Lighting is not generally focused on as much even though it consumes about 10 - 15% of total domestic electricity consumption and thus costs about 10 - 15% of the total value of an electricity bill.¹⁰⁹ As the name suggests, “energy-saving lighting” saves a lot in electricity consumption as an energy-saving lamp consumes about 80% less electricity than do ordinary lamps. Although the energy-saving light bulb is more expensive than traditional light bulbs (between \$6.5 and \$10 depending on the size, whereas traditional light bulbs are less than a dollar), the operational life of the energy-saving light bulb is about 8 times greater than that of

106- Ibid.

107- Ibid.

108- Ibid.

109- Afaq, issue 28

an ordinary light bulb. In a medium-sized house these bulbs would be replaced every few years.¹¹⁰ The expected savings from replacing a 100-watt capacity traditional light bulb with a 20-watt capacity energy-saving one is 80 watts per hour of use. This means 144 kilowatt-hours per year



(per 1,800 hours lighting, and assuming that the traditional lamp or the energy-saving one works an average of five hours a day, during 365 days per year).¹¹¹

Investment quickly recovers its value

In the 1967 Occupied Palestinian Territory, we can only recommend the enactment of a law that ensures the gradual removal of traditional light bulbs from the market. Calculations made by energy experts show that replacing traditional lamps with energy saving lamps in the homes of the West Bank and the Gaza Strip will save about 4% of the electricity consumption in these regions, the equivalent of hundreds of millions of kilowatt-hours annually.¹¹² This implies saving tens of millions of dollars to Palestinian consumers. If we include offices and public buildings (schools, hospitals, government institutions, etc.), the savings will be even greater (up to 7%). (Note that a part of the public buildings are currently illuminated with fluorescent lamps.)¹¹³

Perhaps the main obstruction that prevents the

country's transition to energy-saving lamps lies in cost, as the cost of replacing all traditional lamps in a medium home with energy-saving fluorescent lamps can cost up to 40 -50 dollars.¹¹⁴ However, government agencies have an interest in driving people to this transformation through subsidies and other incentives, as this transition is ideal for consumers and the economy in the long run with the longer operational life and low electricity consumption of fluorescent lamps. In addition, the heat emitted by traditional lamps means more electricity may be used to cool a house. In this respect, we can follow the example of European countries which slightly raised prices of electricity and refrained from reducing them even when fuel prices dropped. This way, the accumulated funds could be invested in a special fund aimed at supporting the transition to energy-saving lamps.

Disadvantages

Western health authorities warn that most energy-saving fluorescent lamps contain liquid mercury, which is a toxic metal, that can cause breathing problems. According to the U.S. Department of the Environment guidelines, a room where an energy saving lamp is broken must be vacated quickly and for a period of not less than fifteen minutes.¹¹⁵ Broken pieces must not be vacuumed with vacuum cleaner, rather rubber gloves must be worn to collect broken pieces with an ordinary broom and dustpan. They must then be placed in a hermetically-sealed bag and quickly dumped in a municipal container.¹¹⁶ For safe use of these lamps, which may emit some radiation, some experts recommend that exposure to their direct light from a distance of less than thirty centimeters not exceed one hour a day. This is because a person who is very close to the lamp may be exposed to ultraviolet rays that are known to cause skin cancer.¹¹⁷ Despite the lack of research on the prevalence of skin cancer in those exposed to the radiation of energy-saving lamps, it is advisable to follow preventative measures.

¹¹⁰- Ibid.

¹¹¹- Ibid.

¹¹²- Afaq, issue 28, ibid

¹¹³- Ibid.

¹¹⁴- Ibid.

¹¹⁵- Afaq, issue 32

¹¹⁶- Ibid.

¹¹⁷- Ibid.

Solutions

In the long run, LED lighting is considered to be a much better alternative to fluorescent lighting, as it is of the best quality, the most energy-efficient, mercury-free, and with no other negative effects on the environment. This is the lighting that is currently found in modern cell phone screens, television screens and traffic lights, though it may take some time before it becomes commonplace in homes as well. The “Smicom Lexis” company recently marketed a new line of energy-saving lamps that are free of mercury and composed of a different mixture of metals that is not harmful to health. These lamps are not dangerous when broken, and their price is equal to or sometimes less than that of mercury lamps. If they are dumped in a landfill and not recycled, they would not cause any damage to groundwater. Currently, producers of energy-saving lamps are working to gradually develop their products; some add extra glass coating on the lamps to minimize the risk of radiation. The problem lies in that cannot often know whether a lamp contains protective layers or if it is mercury-free. Clear labeling on lamp packaging could solve this problem.

Institutionalizing clean electricity production systems



Falah Demeiri explains the workings of a solar power plant in Jericho.

Several companies specialized in installing solar systems according to photovoltaic (PV) technology—which converts sunlight into electricity—are currently in circulation. The system consists of silicon panels, glass and other components. Electricity generated by the system is passed to the electricity grid. The power of the smallest system to generate electricity from the sun is 4 kW. This system is suitable for domestic applications and need not exceed 32 m². For individuals (homes), the maximum magnitude of the installation is 15 kW, while in cases of commercial establishments it could reach to 50 kW.¹¹⁸

In order to institutionalize the process of disseminating clean electricity networks generated from solar energy or wind power and to encourage electricity consumers to participate effectively in adopting these renewable energy systems, it is recommended that the government, for example, give tax exemptions for those who install systems up to 4 kW, and whose annual income does not exceed a certain amount (\$ 5,000 for example). From the regulatory and legal aspects, the municipality or village council must provide the necessary permits. Following the installation of a solar (or wind) electrical system by the authorized company on the rooftops of houses or commercial buildings, it is imperative to inform the electricity company in order to connect the electrical current generated by the alternative system to the public network. This way, the technician from the power company can replace the ordinary domestic electricity meter with another one divided into two parts: a counter for production and another one for consumption.

¹¹⁸ Afaq, issue 19, ibid

Clearance with the electricity company

There is a separate measurement system for consumption through an ordinary counter that often resides in the entrance of the house. There is also a special counter to measure the amount of electricity produced by the solar panel or wind tower, which is turned to the electricity grid. Based on the data from the two counters, the company makes a clearance process for the individual customers, turning their financial dues to their bank accounts.

There can be problems in establishing such systems in shared homes (such as buildings consisting of a few apartments) as there is a lack of space on the roofs and because the electricity bill must be registered in the name a specific person or on behalf of a known legal entity (foundation, association, etc.). However, the committees of residential buildings can develop a system to serve all the residents of these buildings and provide electricity for the common systems such as lighting and pumping that in the long run save money for the common fund.

The price of electricity produced by the alternative system

Power companies could take the initiative to support and protect the process of producing electricity from solar PV panels or wind towers. For example, an electricity company may buy (from the consumer) the alternative electricity with “x” dollars rate, but the tariff levied by the company per kilowatt of traditional electricity (carbon source) may be “y” dollars, so that: $x > y$, i.e., the purchase price of alternative electricity is higher than the levy price of conventional electricity. That is for the benefit of the producer and the consumer of alternative electricity. Purchase price may be twice the levy tariff, where is $x = 2y$.

In addition, the accounting of the electricity firm may be based purely on financial grounds and not on the amount of electricity consumption, where the alternative electricity consumption is free and above that the electricity company pays for the consumer a certain symbolic monthly amount as a matter of encouraging the practice, considering that the producer of alternative electricity has saved the company a certain amount of conven-

tional electricity and accompanying costs of distribution, pollution, and so on. If we assume that a particular consumer has produced 40 kW and has also consumed 40 kW, the power company will pay the consumer at the end of the month a certain amount tied to the high cost of living, and relatively for a long period of time (20 years, for example).

The life span of alternative electrical system

With the passage of time, the alternative electrical system gradually loses its effectiveness. The primary reason for this is the reduced effectiveness of silicon which produces electricity. Manufacturers of these systems report that the production capacity decline is between 0.3% and 0.5% annually, and they award warranty until the falling production capacity reaches 1% annually.¹¹⁹ According to the companies, the life span of the system is between 20 - 25 years.¹²⁰ The system can, of course, continue to provide electricity for a longer period than that, provided that the components remain intact and undamaged.



Mahmoud Shaheen explains the mechanism of PV cells that illuminate his home in Gaza and power his electric appliances.

119- Ibid.

120- Ibid.

It is worth mentioning that the Palestinian Energy Authority (West Bank) launched the “Palestine for solar energy” initiative in 2012, which aims to motivate consumers to produce electricity themselves (on the roofs of their homes) through the purchase and installation of photoelectric cells to generate electricity. At the first stage, the authority aims to engage a thousand homes in this initiative by which consumers can sell surplus electricity produced by them to the power company at a preferential price that encourages other consumers to join the initiative.¹²¹

Electricity based on wind energy

In addition to the solar electric system that allows individual consumers to install photovoltaic panels to produce electricity, individuals can also rely on wind energy by installing wind generators for self-consumption of electricity. At the country level, small wind towers (generators) can be installed. These towers may generate tens of megawatts altogether. Every electricity consumer, be it an individual or a commercial consumer, municipalities, public institutions, or local councils can set up a wind generator on the roof of their building and sell the surplus to the electricity company at a special price. The tariff is determined by the size of the towers; for example, one tariff for towers that reach a capacity of up to 15 kW (per kilowatt-hour), and another tariff per kilowatt-hour for the towers that have a capacity between 15 and 50 kW. The continuation of pricing could be ensured over a certain period of time (perhaps 20 years, from the moment of connecting the wind facility to the electricity grid). As in the case of solar electricity systems, it is also necessary in the system of electricity generation from wind to abide by terms of safety, security, and electrical requirements imposed by the law.

Reducing electricity fees for citizens who reduce consumption:

The Palestinian case

In the Palestinian context, not only is there an environmental consideration behind saving electricity, but there is also the motive of increasing

independence from Israel, which Palestinians are currently entirely dependent on for electricity. This means reducing the leak of accumulated financial surplus and re-investing this surplus internally in a productive and sustainable manner. This endeavor not only protects local resources and reduces environmental pollution, it is also compatible with Palestinians’ desire to resist occupation and pursue self-sufficiency.

We can save a lot in our household energy consumption and especially in electricity by changing our behavior and habits in this regard, particularly if we know that most of our needs for energy in the house are mainly to provide hot water, heating and cooling, heating and cooling food (ovens and refrigerators), lighting, and washing clothes. To encourage citizens to reduce their consumption of electricity, the electricity supplier company may initiate granting the consumer a 20% reduction on the cost of consumed electricity if they reduce their electricity consumption by 20%. It is certain that a national environmental orientation like this will enable both consumers and electricity companies to achieve substantial savings in electrical energy, not to mention the many benefits to the environment itself. Such a system is applied with great success in California under the name of “20/20”: whoever can save 20% of the consumption of electricity in the home compared with parallel month from the past year gets a discount rate of 20% on consumed electricity.¹²² This system has been developing in California since 2001, and according to electricity companies data there, 34% of consumers have managed, since that year, to reduce their consumption by at least 20%.¹²³

As one Palestinian family consumes hundreds of kilowatt-hours per month on average, a reduction of 20% may save the consumer 15-25 dollars per month on average.¹²⁴ So, on the basis of national and environmental motives, the efficiency of the electricity sector must be increased and a serious and great reduction in the use of electricity should take place by changing consumption habits. In order to achieve the objective of reducing electricity consumption by at least 20%, consumers must be encouraged to turn to energy-saving and

¹²²- Afaq, issue 25, ibid

¹²³- Ibid.

¹²⁴- Ibid.

more efficient electrical devices and devices that do not require electricity such as water heating by solar energy (instead of electrical boilers), non-electrical washing machines that operate by hand or by pedal, and clotheslines for drying by solar energy rather than a drying machine. This approach requires comprehensive awareness campaigns for the public. In order to motivate consumers to save and rationalize their consumption of electricity, the Palestinian Energy Authority (in the West Bank), launched the “save and win” initiative in the summer of 2012 to encourage reduced electricity consumption with a series of initiatives designed to save at least 5% of the electrical energy consumed by Palestinians by 2020.¹²⁵ In the framework of this initiative, all consumers are invited to register and pledge to reduce their electricity consumption by at least 10% of current usage. Accordingly, consumers are rewarded with a reduction in the value of their bill with rates ranging from a minimum of 5% to a maximum of 22% according to the company and the region in which it operates.¹²⁶ The Energy Authority is also working to launch an energy audit initiative of homes that aims to inform homeowners on how to optimize the use of electric appliances to reduce the amount of wasted energy and decrease electricity bills. The Authority has conducted an energy audit of 15 buildings including hospitals, universities, and hotels.¹²⁷

Generating electricity from organic and agricultural wastes

Many countries started long ago to recycle food waste to produce electricity. In the current context, the fate of most Palestinian organic waste is landfills. Serious thinking and planning must take place to encourage the trend towards the production of clean electricity from organic waste; and consequently, to promote self-reliance in energy consumption. However, the Palestinian case is not very encouraging thus far. In the West Bank and Gaza Strip, it is assumed that the high percentage of organic wastes, which range between 60 - 70% of total solid waste, could be manufactured into compost and organic fertilizer, which would dra-

matically reduce the volume of solid waste. The manufacture of compost requires a simple and inexpensive technique,¹²⁸ but unfortunately, compost manufacturing on the Palestinian level is marginal.

As a starting point, we propose instituting a common project among certain concerned Palestinian institutions and companies; for example, between the Ministry of Environmental affairs and the electricity company. This would be to encourage people and institutions to produce electricity from organic waste by paying certain tariffs per kilowatt-hour of electricity produced from biogas, which is produced from organic waste. It is possible at first to rely mainly on urban waste, specifically waste from houses, agricultural residues of pruning and crop waste, or other organic materials. According to estimates of *Afaq el Beea wa el Tanmiya* magazine (environment and development prospects), the amount of organic waste in the West Bank and the Gaza Strip available to use for biogas is more than one million and a half tons per year. We believe this quantity is capable of producing more than 30 MW.¹²⁹ The establishment of facilities for the production of energy from organic waste is relatively inexpensive. Governmental and non-governmental organizations may try to get financial assistance for the establishment of such facilities near major cities in order to save the cost of transporting waste to distant places.

Of course, the goal of recycling organic waste is not only the production of environmentally-friendly electricity, but also to reduce the volume of organic waste, most of which is currently buried in random and unhealthy dumpsites scattered throughout the West Bank and Gaza Strip. It is important to reduce the volume of waste buried in the ground or in random dumpsites, as most existing landfills have reached saturation and it is difficult to find new spaces for the establishment of additional landfills. To encourage local authorities to take serious action towards waste separation and recycling and thus reduce the waste buried in landfills, landfill fees and holding fees (per ton of waste) must be imposed.

125- “Al-Quds” newspaper, ibid.

126- Ibid.

127- Ibid.

128- Kurzom, patterns of dealing, 2009

129- Afaq, issue 31, ibid.

In recent years, some ministries of the environment and electricity companies in many Arab and Asian countries have started to produce electricity from organic solid waste and biomass and several installations for the production of electricity from biomass have been established. There are many environmental benefits to this practice, most importantly reducing fossil electricity consumption as well as the quantities of waste buried in landfills. In addition, methane released from the burning of waste is harnessed for electricity rather than being admitted into the atmosphere to further contribute to global warming. The pricing of electricity generated from biomass would likely be determined according to the intensity of technology used.

In the West Bank and Gaza Strip, some limited experimental installations for the production of methane from organic solid waste for the purposes of use in cooking were established but their function was halted with the interruption of funding. Some Palestinians in Gaza were able to create simple and practical methods to produce methane gas for cooking instead of relying on Israeli gas. The main idea is to collect manure and animal waste, and put it in an empty drum that is then closed hermetically, and then connect that to another empty drum with a tube. A few days later, waste fermentation starts and gas begins to fill the empty drum that is connected to a fireplace or a gas oven. This gas has an ignition ability similar to that of the traditional cooking gas. Ten kilograms of waste are sufficient for extracting a quantity of gas to meet home needs, and this quantity can be obtained from a limited number of cattle.

However, a number of problems may hinder the implementation of such a project. Occasionally, the waste cannot reach a sufficient temperature for an adequate fermentation process, which decreases the level of methane gas produced. But based on Palestinian experiences of extracting gas from organic waste, it seems much more progress toward generating electricity from gas can be achieved. Electricity could also be produced from gas emitted from the sludge of wastewater treatment plants, where the collected gas would be used to run the generators for the production of household electricity.

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Three:

Mitigating Air Pollution

tion. Also, the choke should not be used too much, and when the car is cold, it is necessary to drive slowly. Finally, if a car must stop and wait, as in a traffic jam, it is best to turn off the motor.

Haifa's industrial zone is one of the most dangerous sources of greenhouse gas emissions in Palestine.



Air pollution is the primary cause of critical climate and environmental changes. This is why it is crucial to initiate, at the local, national, and individual levels, a drastic change in our consumption patterns. At the individual level, we can summarize the most important practices that contribute to the mitigation of air pollution, as follows:

First: limiting car use for short distances and walking, biking, or using public transport instead. The use of public transportation reduces the number of cars on the road and therefore significantly cuts down fuel consumption and lowers toxic emissions.

In the oPt, the annual expenditure average on the use of an ordinary car, including fuel, insurance, licensing and car depreciation and maintenance, ranges from \$2300 to \$2800, which is an amount equivalent to about 30% of the annual per capita income average in the West Bank.

Second: we should always check air pressure in cars' tires, because the proper air pressure is safer and also saves about five per cent of fuel consump-

Third: the deliberate burning of waste must be stopped as burning waste produces toxic gases and has a negative impact on our health.

Fourth: growing herbs and trees around our homes and in the near vicinity stabilizes the soil and other particles and prevents dust formation. Trees purify the air from pollutants.

Fifth: we must reduce energy waste as much as possible. Washing machines, dishwashers, dryers, freezers and other electrical appliances consume electricity that is produced from the burning of fossil fuels and thus contribute to global warming. Limiting electricity consumption not only saves money but also reduces air pollution.

Sixth: avoid purchasing spray bottles containing CFCs (chlorine, fluorine and carbon) as these gases are some of the most serious factors in climate change. However, while old refrigerators contain CFCs, new ones do not contain these compounds.

Four:

Reducing Land Degradation

(Palestinian case)

Blatant facts in the occupied Palestinian territories prove that the Israeli occupation was, and still is, the most dangerous devastating factor to Palestinian land and environment. The separation wall has taken hundreds of thousands of acres of cultivated and fertile Palestinian lands. Israel has also destroyed green cover with the uprooting of hundreds of thousands of carob, olive, almond and palm trees. In addition to the uprooting rare wild plants and the theft of fertile topsoil, some animal species in the Jenin area and the Jordan Valley, like some wild birds, deer, hedgehogs, wolves and hyenas, are now under threat of extinction. Moreover, Israel has re-routed Palestinian ground and surface waters for the benefit of Israeli settlements and for Israelis inside Israel proper. This has led to the drying up of wells and natural springs, to the destruction of much of Palestinian agriculture, and more indirectly, to the desertification of some Palestinian territories. Since the Al-Aqsa Intifada in late 2000, Israeli sabotage of the Palestinian environment has reached an unprecedented peak, with massive bulldozing and destruction of agricultural lands and forest areas, and the uprooting nearly two million fruit trees.

Despite the factors of environmental destruction related to the occupation, Palestinian society also bears an important share of the responsibility for the ongoing environmental destruction. For example, due to the absence of law and prevalence of poverty in the Jenin area, some residents burn and chop down thousands of trees where there are about 270 thousand acres of forest. Some forests in other areas are also being destroyed or deteriorated, causing not only the loss of natural ecosystems, biodiversity, and renewable resources, but also dangerous processes such as soil erosion and floods. In addition to the main role of occupation in the destruction of trees, fires and urban expansion also cause destruction of those trees. Because

In the absence of retaining walls and stone chains to protect the soil, rain leads to soil erosion and the gradual extinction of vegetation.



of urban expansion and the increased demand for stones, gravel, and sand as materials for construction, quarries play an important role in the degradation of forests. Most quarries were established randomly, without compliance with the principles and rules of environmental and health safety.

Land degradation in arid and semi-arid areas, such as in Palestine, is known scientifically as desertification. Desertification is not the increase in desert areas, but is in fact the deterioration of an environment that was previously stable through deforestation, plant cover erosion, overgrazing, salinization of irrigated lands, soil exhaustion through excessiveness in intensive commercial chemical monoculture, and other reasons. Natural and modified forests are major carbon gas stores. By absorbing heat and water and then releasing them back into the atmosphere, forests and woodlands play a key role in climate regulation. Forests also prevent soil erosion and landslides by absorbing heavy rainfall and therefore reducing rainwater waste. Forests



also raise soil moisture and air humidity, and act as windbreakers in agricultural lands, reducing the loss of fertile topsoil and reducing damage caused by dust storms and cold air currents. In the end, trees prevent the aggravation of desertification. In cities, trees absorb the noise of cars and factories, and purify the air of dust, pollutants, and toxic gases, in addition to providing a healthy environment with green leaves that absorb carbon dioxide and release oxygen. Trees are a source of food, fruit, medicinal herbs, fuel, building materials, animal feed, organic fertilizer, and raw materials for the production of gum, cellulose, paper, fiber, rubber, oils, glucose, vinegar, alcohol, and so on.

Individually and collectively, we can adhere to some environmental practices that contribute to the preservation of our lands and lessen the process of degradation. The most important of these practices include:

First:

intensive planting of trees to avoid the expected consequences of land erosion. Schools can play an important environmental educational role through the promotion of tree-planting, teaching children and students about tree-planting methods and techniques, and establishing plant nurseries in the schools.

Second:

planting trees in housing areas, establishing and maintaining public parks, and maintaining forests and wild lands.

Third:

reducing the use of paper products, reusing and recycling them, and using recycled paper.

Fourth:

buy recycled products.

Fifth:

compensating for firewood from forests by re-planting trees.

Sixth:

collecting seeds from woodlands and forests and distributing them for cultivation

Seventh:

launching education campaigns that aim at educating youth about the importance of trees and forests .

Eighth:

to avoid irresponsible use of fire in forested areas, and to refrain from drilling on the trunks of trees.

Five:

Changing Transportation Habits

Damage caused by intensive use of private cars

Excessive use of private cars causes economic damages that can affect a high percentage of gross national product. We can summarize the most important environmental and health damages caused by the use of cars as follows:

Air pollution: can lead to disease and higher rates of death.

Traffic jams: cause the loss of many work hours for the local economy.

Loss of open spaces: streets and crossroads deplete large tracts of lands when often, there may be no need to create a junction. Junctions can deplete an area of up to one square kilometers or more, land that could have been used for other more useful purposes such as open land or natural reservation or lands for building.

Road Accidents: accidents cause considerable human casualties and material losses.

Obesity: the use of the car over walking or biking leads to a significant increase in the proportion of people who suffer from excess weight and lack of physical activity. Some research has demonstrated that boys who go to school by foot or by bike instead of by car enjoy a more balanced upbringing as they develop social relationships and develop healthy habits.

Noise: sustained exposure to noise is a detrimental factor to the quality of life and is harmful to long-term health. People who live next to congested traffic areas can suffer from acute noise trauma.

Groundwater pollution: water flowing from the streets contains toxic and hazardous substances that seep into water resources and pollute them.

Environmental alternative

Many experts believe that the solution to the aforementioned problems lies in minimizing travel by private car and encouraging the use of public transport. Many cities in the world have been able to make a significant reduction in the use of private cars through the use of simple and cheap means such as the allocation of special lanes for public transport, a comfortable and efficient information system for travelers, proper practical planning of communication lines, etc. Other means include encouraging work from home and collective travel of employees, workers, and students, ensuring reduced use of private cars. It is time to limit our exaggerated dependency on private cars and increase our environmentally-friendly alternatives. Large numbers of workers and employees reach their places of work by their cars, a smaller number use public transport, and the smallest percentage travels by foot. For comparison, only 12% of workers in London reach their places of work by car, while 81% use public transportation.¹³⁰ Of course, motivating people to use public transportation requires promoting the use of public buses and vehicles within and between cities and towns at reasonable prices, as well as the provision of appropriate infrastructure such as streets, roads, and special stations for public vehicles.

Despite the current absence of infrastructure, we should not necessarily wait for a change in the country or government to start changing our habits. We can start at the level of the workplace with easy practical steps aimed at greatly reducing the use of private and public cars, which have been the main factor in the development of transport infrastructure. This can be accomplished by providing incentives to encourage the reduction of vehicles' use. In this context, it can be useful to learn from the experiences of some foreign companies that decided to allocate a monthly specific ceiling of fixed kilometers per employee (including the use of an employee's own car during the workday). At the end of the month, the employee





Air pollutants resulting from large traffic jams in Palestinian cities constitute one of the biggest causes of respiratory diseases among children.

receives a report detailing how he or she used the car, and is thus held financially accountable. In the event that an employee traveled less than the allotted ceiling, the excess amount is transferred to his bank account. If the use of the car is over the ceiling, then the excess financial value is deducted from the employee's monthly salary. This method has positively affected the driving habits of employees. Indeed, some companies such as the Belgian "Ford" that have successfully implemented this method aimed at changing behavioral patterns related to transport have managed to reduce the number of employees who drive to work by 27.8% of the total 12 thousand employees in the company.¹³¹

Finally, we can take advantage of the current economic crisis as an opportune time to start changing transportation habits, as in times of economic affluence it is difficult to convince institutions, organizations and companies to behave this an environmentally- and economically-friendly way. There is clearly an urgent need for everyone to economize in fuel consumption and associated expenses, including expenses related to the maintenance of cars. Economizing at an institutional level is far preferable to dismissing employees for financial reasons.

Of course, motivating people to use public transportation requires promoting the use of public buses and vehicles within and between cities and towns at reasonable prices, as well as the provision of appropriate infrastructure such as streets, roads, and special stations for public vehicles.

¹³¹- Ibid.

Six:

Environmental Corporations' Agenda

Global companies are becoming increasingly aware of the importance of environmental issues in the business world. Environmental strategies have become an essential component of many corporations' strategies. During the next few years, if a company does not elaborate a clear environmental agenda and does not take into account environmental issues, the company is not expected to survive. In European countries, companies almost always have departments of environment and environment quality managers. In addition, many managers of western companies have environmental advisors for the purpose of reducing energy consumption and raising energy efficiency in the company.

Unfortunately, in most Arab countries, including the West Bank and the Gaza Strip, there is no law that aims to prevent air pollution and reduce greenhouse gas emissions. Implementing such a law would contribute to achieving medium- and long-term goals such as reducing emissions by 25% before the end of 2020, or by 50% before the end of 2050. Based on global developments in the field of environmental concern in the business world, our advice to local and Arab companies would be that they promptly appoint environmental consultants who work to develop environmental policies and strategies to pursue higher energy efficiency, which would also increase profits and incomes in the company. Many companies have started to work on accomplishing the goal of reducing emissions through their orientation towards an economy based on scarcity, and their recognition that seizing the opportunities and exploiting environmental resources in a green and effective way, will generate profits and achieve competitive advantage.

Today we not only face an economic crisis, we face a climate crisis. Managers of today and tomorrow must shoulder the responsibility of finding a com-

mon denominator between economic thinking and environmental needs, and must develop solutions for commercial interests and for communities to bring about a prosperous, clean future that is in line with environmental values.

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Seven:

Biofuels

Environmental curse or a solution to climate crisis?

In recent years, the number of politicians who embrace the goal of green energy has increased and investment in biofuel-related research has also increased. But what is biofuel, and is it really feasible to produce different types of plant-based fuel?

Following the worsening of global oil crisis and the problems of air pollution related to oil use, some governments have begun to encourage the use of oil alternatives extracted from plants' oils and natural products. Among the most important of these alternatives are the ones that are produced from corn (from the United States, Canada, and other countries), pistachios, sugar cane (Brazil), soy, and even wheat (Canada and others). The United States was the first country to encourage the use of biofuels, and the U.S. government's decision to turn some varieties of food crops into fuel production, have caused a high increase in their prices.

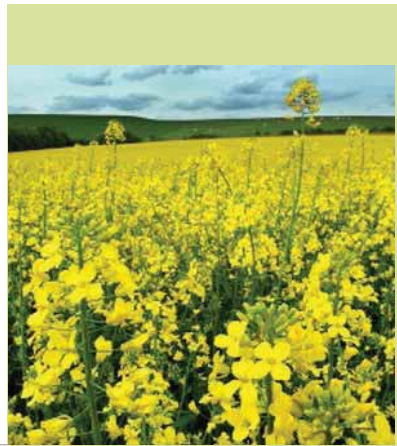
Characteristics of biofuel

We can say that biofuel is a power resulting from any possible use of biological material. However, in the current global context the definition of biofuel is based on the idea of replacing petroleum oil, the price of which depends on the extent of political stability in different parts of the world. There are currently two types of biofuels that can be used in all common types of motors: biodiesel and bio-ethanol. The first is based on oils, the second is based on alcohol.¹³² They are often produced from plant materials and their basic characteristic is that their use is similar to the current use of oil.

Bio-ethanol is an alcohol produced in a manner similar to that of alcoholic beverage produc-

tion, so that vodka could be considered to be bio-ethanol if the percentage of alcohol were increased to a sufficient level. Currently, the use of bio-ethanol is the most applied form of biofuel.¹³³ Brazil, for example, has been running its cars for the last few years using alcohol extracted from sugar cane.¹³⁴

Bio-diesel, on the other hand, is extracted and refined from oils that come from certain parts of a plant. Just as oil can be extracted from olives, there are current trends to equip vehicles with oil from soy and cotton.¹³⁵ Another modern solution currently gaining more supporters and investors is the extraction of oil from unicellular algae. It turns out that these greenish microorganisms have a large capacity for producing oil.¹³⁶



A biofuel farm.



A biofuel station for cars.

¹³²- Richter, pp.173-183 and p. 188 (ibid)

¹³³- Ibid.

¹³⁴- Ibid.

¹³⁵-Ibid.

¹³⁶- Ibid.

Disadvantages of biofuel

Alcohol extracted from plants requires a significant refining process that involved burning materials for heating; this use of fossil fuel leads to further air pollution and greenhouse gas emissions. Plants used in the extraction of fuel are often crops used in the food industry, and their price depends their demand. If all the corn in agricultural fields were allocated for the production of fuel, the result would be less corn for other uses and thus a high price tag. The price of many food products would also rise. There is also the issue of agricultural land: if more and more farmland is used as “green oil” fields, the less the area of land that can be devoted to agriculture. In fact, recent calculations show that there are not enough arable lands in the world to produce enough biofuel to replace oil from fossil fuels.¹³⁷ However, many owners of agricultural lands do not hesitate to convert their lands to grow crops to sell to biofuels companies instead of food companies because fuel companies will pay more.¹³⁸ In addition, biofuel companies are less selective with the quality of the crops; the corn need not be aesthetically pleasing for the production of fuel as is necessary in the food industry. There are also no restrictions on the amounts of pesticides sprayed as the crop is not intended for food.

All the previous problems are based on estimates and calculations that did not take into account future technological development. Newer advanced methods in chemical engineering may facilitate the process of refining alcohol and thus reduce the level of pollution. Certain agricultural processes can produce agricultural crops that contain larger quantities of oils. Genetic engineering techniques are considered the fastest way to provide plants with certain desirable qualities in fuel industry, but these techniques also have dangerous environmental and health flaws and disadvantages. Many experts believe that, in the next century we would not be able to replace even half of the amount of currently-used fossil fuel oil with biofuels without the use of genetic engineering.¹³⁹ And though ge-

netic engineering may help solve problems of food and fuel, it may also have dangerous unpredictable consequences.

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if more and more farmland is used as “green oil” fields, the less the area of land that can be devoted to agriculture. In fact, recent calculations show that there are not enough arable lands in the world to produce enough biofuel to replace oil from fossil fuels.

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Commercial-political calculations

For many environmentalists, turning food crops into fuel is a “curse” rather than a solution to environmental problems. Some countries like the United States, which has a long history of harming the environment at the local and global levels, have rushed to the biofuels industry not for environmental reasons but for economic and political reasons. The US has thus portrayed itself as being concerned for the environment while promoting an environmentally-flawed product. This is the country that accounts for a quarter of worldwide carbon dioxide emissions and that has been responsible for the destruction of millions of hectares of green areas and forests in countries occupied by U.S., where the military apparatus has ravaged ecosystems in Vietnam, Iraq, Afghanistan and elsewhere.

In theory, plants are a cleaner source of fuel than oil as they do not increase the proportion of carbon dioxide in the air. But biofuel has been disastrous from

¹³⁷- Ibid.

¹³⁸- Ibid.

¹³⁹- Ibid.

a humanitarian perspective, especially since this fuel contributed to a large extent to the world prices rise of certain important grains. From 2007 to 2008, the price of grains such as corn, rice, and wheat that are staples for the world's poor rose three-fold. This severely worsened famine and led to an outbreak of popular protests in many Asian and African countries.¹⁴⁰ Also, economic and commercial incentives prompt monopolistic companies to destroy or burn grassland and rain forests in order to increase areas to be planted with biofuels grains; this leads to the emission of more greenhouse gases because of erosion and fires.¹⁴¹ In addition, nitrogenous fertilizers used in cultivation of grains produce nitrous oxide, which is a greenhouse gas far more dangerous than carbon dioxide. The large commercial production of biofuel would require huge monocultures of corn, soy, sugar cane and others, which involves replacing indigenous and local crops, putting small producers at a disadvantage, and threatening agricultural biodiversity and rich traditional agricultural knowledge across generations.

An increase food consumption in some Asian countries such as China, and climatic disasters also played an important role in the issue of prices. But the accelerated rush toward the production of ethanol is also responsible, to a large extent, for the rise in prices. The basic motives underlying this industry are primarily economic and political, not environmental. However, producers of grain for ethanol claim that they are the victims in the inflation of global food prices. They say the high prices are weakly tied to cost of grains, and are closely linked to the cost of energy, which increased by more than 100% during the biennium 2007 – 2008.¹⁴² But the issue here is that the U.S. administration deals with the issue of atmospheric pollution and climate change from the perspective of its financial and commercial interests. The administration stresses that ethanol produced from corn and used as a substitute for gasoline contributes to the reduction of U.S. dependence on oil imports from politically unstable countries. More than a quarter of U.S. corn crops are currently being turned to biofuel¹⁴³.

The solution

Why has the concept of energy not been completely revolutionized? Why should we be restricted to energy in a liquid state? Some believe that hydrogen is one of the cleanest modes of energy from an environmental perspective, as this gas can be produced artificially through the electrolysis of water. It can also be produced biologically through the reaction of some enzymes with certain types of bacteria and algae.¹⁴⁴ The use of hydrogen as a fuel for engines may be easier than the use of fuel oil. Despite being potentially explosive, safe methods for storage and usage of the gas been developed in recent years.¹⁴⁵ It is perhaps infeasible to invest in the development of liquid fuel from a plant source as the process further contributes to air pollution, it produces less energy, and negatively impacts the food market and agricultural land. But the problem lies in the powerful fuel market. In order to put pressure on strong economic powers such as the Organization of Petroleum Exporting Countries (OPEC) and the global auto industry, one must possess more than just scientific fact.

We can closely examine fuel options based on two criteria: the form and the engine. The state of oil currently used is liquid, the cost of its transportation is cheap, and it is running internal combustion engines. If we look beyond hydrogen, we find that the energy dilemma requires a radical change in methods of fuel production and transportation, as well as the creation of new kinds of cars altogether. Perhaps the main advantage of biofuel is its liquid state, which means it can be transported from one place to another without problem. It is also suitable for most vehicles currently manufactured, so there is no need to invest in the development of special new cars for biofuel; automakers such as Volkswagen, Peugeot and others do not care if Brazilians drive their cars with fossil fuel or sugar cane. A global situation free from the dependency on petroleum will facilitate the implementation of environmentally-friendly solutions.

¹⁴⁰- Holt-Giménez et al., 2009, pp.68-80

¹⁴¹- Ibid.

¹⁴²- Ibid.

¹⁴³- Ibid.

¹⁴⁴- Ibid.

¹⁴⁵- Ibid.

Fuel from plant waste

Many consider plant ethanol to be an environmentally and socially flawed product because it may limit food production and thus exacerbate poverty and hunger. Therefore, in the search for other renewable energy sources, some scientific and environmental agencies have begun to work on turning low-value materials into ethanol to fuel cars, which is then known as the “second generation” of biofuel.¹⁴⁶ These materials consist mainly of agricultural waste, such as straw, hay and corn husks, as well as weeds, algae, animal manure, wood and other organic materials.¹⁴⁷ Some biotechnology scientists and experts believe that these materials can replace corn, wheat and other grains as raw materials for ethanol, which will ease, to a large extent, the pressure on agricultural lands, which has played a major role in the rise in grain prices.¹⁴⁸ With regard to agricultural waste, the basic idea is to use green material such as leaves, stems and peels for the production of biofuel, instead of using grain for food.¹⁴⁹

However, turning agricultural waste into fuel is facing technical difficulties that experts are working to overcome. The cellulose from which ethanol is extracted is spun in a tight network form, which complicates the process of extracting glucose (essential for the manufacture of ethanol), and raises its cost.¹⁵⁰ Currently, cellulose provides less energy than corn, but with advances in technology, it is expected that the energy of ethanol produced from cellulose will range between 3 - 8 times the energy of ethanol produced from corn.¹⁵¹

146- Ibid.

147- Ibid.

148- Ibid.

149- Ibid.

150- Ibid.

151- Ibid.

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Some countries like the United States, which has a long history of harming the environment at the local and global levels, have rushed to the biofuels industry not for environmental reasons but for economic and political reasons. The US has thus portrayed itself as being concerned for the environment while promoting an environmentally-flawed product. This is the country that accounts for a quarter of worldwide carbon dioxide emissions and that has been responsible for the destruction of millions of hectares of green areas and forests in countries occupied by U.S., where the military apparatus has ravaged ecosystems in Vietnam, Iraq, Afghanistan and elsewhere.

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Eight:

Global Warming and the Meat Industry



Reduced meat consumption would lead to reduced global warming.

The meat industry causes serious negative effects on the environment because of its massive depletion of resources and the high level of pollution it produces. Methane gas emitted by cows is responsible for about 18% of the amount of greenhouse gases emitted into the atmosphere.¹⁵² Farming aimed at providing fodder to feed livestock consumes huge amounts of water and chemical pesticides that seep into the groundwater. Specifically, massive amounts of salt leak into the groundwater in the manufacturing of meat. The production of animal protein requires about 15 times more water than is necessary to produce a similar amount of plant protein.¹⁵³ Animal farms in the United States,¹⁵⁴ for example, produce about 130 times more waste than does the total population of the United States. Moreover, 70% of the grain grown in the United States is used to feed animals.¹⁵⁵ In the United States alone, more than one billion acres of forests have been uprooted in order to provide space for the growing of fodder.¹⁵⁶ Animal

production and related farming is the most important factor in the destruction of species in the United States and the world.

A focus on plant food means not contributing to the promotion of meat industries that do more damage to the environment than do all means of transportation—aircrafts, automobiles, etc.—taken together. If we are not able to switch entirely to vegetarianism, we can at least greatly reduce our consumption of animal products and especially meat. For example, if we limit our consumption of meat to once a week, we not only improve our health conditions, but also contribute to the improvement of our local and global climatic conditions. In general, the more our production of plant food grows and animal food drops, the greater our contribution to the environment protection increases. What many people do not realize is that even if the environmental behavior of someone is perfect in all respects, if their meals contain animal products this leads to a rise of their ecological footprint by 75%.¹⁵⁷

The relationship between dietary habits and the destruction of the environment must be acknowl-

¹⁵²-Steinfeld et al., 2006

¹⁵³- Ibid.

¹⁵⁴- Ibid.

¹⁵⁵- Ibid.

¹⁵⁶- Ibid.

¹⁵⁷- Ibid.

edged if we are to take necessary steps to reverse environmental damage. Although the 2006 United Nations report on livestock confirmed that the animal husbandry sector is responsible for 18% of total greenhouse gas emissions resulting from human activity,¹⁵⁸ the same report raised only a cosmetic solution to the problem. In 2009, a serious shift began to take place in the trend of government agencies concerning the relationship between livestock, consumption, and the environment, and some environmental authorities in the world have clearly recommended reducing the consumption of meat.¹⁵⁹

The debate about the relationship between meat consumption and global warming was raised again recently with the publication of two new papers on the issue. Research for the first paper was conducted by the American organization World Watch, and it reached the conclusion that the global meat industry is responsible for about half of global greenhouse gas emissions in the world, up from the 18% reported in the 2006 United Nations report.¹⁶⁰ The researchers, who are former environmental advisers to the World Bank, claim that the previous UN data reduced the calculation of the devastating impact of emissions resulting from billions of cattle, sheep, pigs and birds in farms around the world, and did not pay enough attention to issues such as the use of land, animals' breathing, and methane emissions. According to their report, the cow industry alone accounts for 37% of methane emissions in the world.¹⁶¹ NASA in the US published further research that stated that methane gas may be 33 times stronger than carbon dioxide and not only 23 times stronger as was previously thought.¹⁶²

A diet based mainly on plant food is a necessary preliminary step to reduce the growing large expenses on health and environmental disasters. A food revolution would eventually lead to the reduction and then closure of the destructive industries that produce animal goods, and such a

transformation is an essential step to slow down the rate of global warming and to seriously reduce pollution and the waste of natural resources.

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*Animal farms in the United States, for example, produce about **130** times more waste than does the total population of the United States. Moreover, **70%** of the grain grown in the United States is used to feed animals. In the United States alone, more than one billion acres of forests have been uprooted in order to provide space for the growing of fodder*

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¹⁵⁸-Ibid.

¹⁵⁹- Afaq, issue 19, ibid.

¹⁶⁰- Afaq, issue 20, ibid.

¹⁶¹- Ibid.

¹⁶²- Ibid.

Nine:

Success Stories

Taking advantage of solar energy in Palestine is an encouraging idea as the region receives abundant amounts of solar energy, with an annual average of solar radiation intensity of about 5.4 kWh/ m². Palestine receives on average more than 2800 hours¹⁶³ of sunshine per year. What also encourages this trend are some modest, though successful, Palestinian applications in the field of alternative energy uses, especially the widespread use of solar energy in the West Bank and Gaza Strip for water heating. This implies mainly using three solar panels where the area of each panel is 1.7 m², and a tank for hot water has a capacity of 200 liters.¹⁶⁴ The system generally covers all daily household needs of hot water (for a family of 6 - 7 members) and for a period extending for more than nine months in a year. During this period, electric boilers or those operating with diesel or gas maybe almost entirely dispensed with. By using solar heating, a family saves at least \$20 per month, taking into account that the heater's capital recovery time is less than two years.¹⁶⁵

In 2011, the percentage of Palestinian households in the West Bank and Gaza Strip that had solar water heaters was about 66%, compared with 66.7% during the year 2010. In 2011 the percentage reached 69.4% in the West Bank and 60.5% in Gaza Strip.¹⁶⁶ Moreover, in the West Bank and Gaza, there are a few service and productive projects that rely on renewable energy, notably a project in the village of "Great Enaab" in the south of Hebron that generates electricity by using a windmill and solar cells in an area that had been electrically isolated from the outside world and was not connected to the main power network. Previously, a part of the village depended on the power produced by an old diesel generator that functioned for only two hours a day and produced carbon dioxide. Presently, all the approximately 150 inhabitants of the Bedouin village as well as the village's school, mosque, and

guestroom benefit of the new project throughout the day. The power plant that consists of a windmill and solar cells has a production value of 18 kW / hour. The project has been able to power washing machines and small refrigerators, and has linked the people of the village with the outside world through television, radio, and telephone.¹⁶⁷

Another project to generate electricity using solar panels was established in the Gaza city neighborhood of Zeitoun, which is one of the most overcrowded neighborhoods in the city. It benefits from solar energy as an alternative renewable energy source to pump groundwater from a depth of forty meters, for lighting and for running certain electrical appliances.¹⁶⁸ A lighting project using solar cells was also established in the village of Atouf in the Palestinian Tubas district, which has a population of about 120 people living in 22 houses. The solar cells system has a capacity of 12 kW and has been installed to provide lighting for the entire village, including lighting the streets.¹⁶⁹ There are also some solar projects in some Bedouin communities that face the threat of being uprooted, such as Ein el Oja, Amuriyah, and Qaryut, as well as in Bethlehem and Hebron and a water pump in the village of Yanoun near Nablus.¹⁷⁰



Solar cells provide electricity for a school in the village of Atouf in occupied Palestine.

163- Kurzom and Omar et al., p. 170

164- Ibid, p.165

165- Ibid.

166- Palestinian Central Bureau of Statistics, ibid.

167- "Al-Beea- wa- El-Tanmiya", issue 2

168- "Al-Beea- wa- El-Tanmiya", issue 3

169- Afaq, issue 45

170- Kurzom and Omar et al., p. 169-170



Solar-powered cooker invented by Thafer Al Helou in Gaza.



Atiya-el-Boursh explains his method of extracting methane gas from organic waste.

Some Palestinian environmentalists have become prominent through their own personal initiatives to produce electricity with sunlight. For example, Mahmoud Shahin in Gaza has had his home fully powered by batteries storing energy from solar cells for more than 20 years. The electricity company does not know his home address and remarkably, whenever the power is cut off in all the houses and institutions of his neighborhood due to the Israeli blockade, his home remains a source of light and electricity and fellow Gazans rush to his home to follow events on television.¹⁷¹ Azmi Nasr from Gaza has stuck small pieces of mirror on the surface of his satellite receiver dish to generate thermal energy needed for cooking.¹⁷²

171- Afaq, issue 7. See also: MA'AN Development Center / MA'AN, pp. 36-39

172- MA'AN Development Center / MA'AN, pp. 24-27

Gaza's Ali Musa, for his part, developed a device for generating electricity from the energy of sea waves in Khan Younis.¹⁷³ Atiyeh el borsh and Maher el Jamal also from Gaza, have devised a system to extract methane gas from organic waste using a simple system consisting of three units: the digester, the filtration and the gas collection cylinder.¹⁷⁴ In his animal farm, the organic farmer Amin el Shawish in the West Bank's Al-Bireh, has transitioned from using a diesel generator for electricity to generating power by windmill. He has been able to generate enough electricity to run a TV, a sheep milking machine, a water pump, and a refrigerator. The energy from the wind is converted, via transformer, to batteries, and then to a second transformer to finally produce electrical energy.¹⁷⁵

The Energy Authority in Ramallah and the United Nations Development Program, have for their part signed an agreement which aims at verifying the feasibility of producing electricity from solar and wind energies in the West Bank. This is part of the Palestinian Initiative for Solar Energy (PSI), which is one of the initiatives outlined in the "General Strategy for Renewable Energy in Palestine," published by the Energy Authority.¹⁷⁶ A solar energy system with a capacity of 4 kW that connects to the network through the Jericho station for solar energy has been attempted.¹⁷⁷ The Palestinian electricity distribution companies have also prepared a manual that explains the necessary procedures for the installation of photovoltaic cells on the rooftops of homes to generate electricity.¹⁷⁸

173- Ibid, pp. 32-35

174- Ibid, pp. 28-31

175- Afaq, issue 6

176- www.wattan.tv (1 / 08 / 2012)

177- Ibid.

178- Ibid.

Summary, conclusions and recommendations

At the individual, collective, and institutional levels, we can summarize the most important environmental practices that greatly contribute to the mitigation of global warming.

First: We must encourage the rationing of non-renewable, fossil fuel energy, preserving its use, and encouraging a shift toward renewable energies. This requires a good isolation of our homes and facilities, a reduction of lighting, the use of energy-efficient lights and electrical appliances, a reduction in the use of cars, and the use of fuel efficient cars.

Second: We must act immediately to reduce the emission of greenhouse gases and to engage in a practical way to combat global warming, through:

- encouraging the reduction of greenhouse gases in the industries and domestic sector, and the transition toward greater use of public transport and saving electricity and water.
- investing in renewable alternative energy sources, such as solar and wind energy or energy from biological sources.
- formation of a government and civil policy that seeks to resolve the major problems caused by climate change, including preparedness in the areas of infrastructure, construction, energy, agriculture, national planning and security systems.

Third: We must take practical measures to develop governmental and civil programs relating to the establishment of solar infrastructure and different stimuli systems. Laws must also be passed and efficient regulatory measures taken, to grant tax exemptions and use other policies to encourage the use of renewable energy.

Fourth: There is an urgent need to preserve all water resources. The efficient use of water must be improved and the need for sea water desalination should be reduced, in addition to pushing agriculture in a direction consistent with conserving water and energy. Water quotas should be implemented in each country to plan for the distribution of water across various sectors.

Fifth: There are many untapped investment opportunities in the field of renewable energy. The volume of global investment in the field of solar energy is only about twenty billion dollars. Investment in solar cells manufacturing in Arab countries and in the West Bank and Gaza Strip is very possible, as is employing various ideas and innovations through scientific research in the field of solar energy and the implementation of patents.

Sixth: There are many ways to harness renewable energy for a better future in the Arab countries. Some ideas include: using renewable energy in the construction and tourism sectors, which would provide new job opportunities; providing distinctive and practical training programs in the field of higher education in areas such as water production and traditional resource conservation.

Seventh: Efforts should be taken to intensively plant trees, as one tree absorbs a large amount of carbon dioxide in the air and in return emits an amount of oxygen sufficient for the lives of four people. Trees purify the atmosphere in general, which means artificial conditioners could be dispensed with, and since they also purify the soil of contaminants, pollution in groundwater would be reduced.

Eighth: The purchase and consumption of local (“baladi”) and organic foods should be encouraged. In organic farming, nitrogenous chemical fertilizers that increase the level of methane gas in the atmosphere and chemical pesticides that contaminate the soil, groundwater, and the air and cause severe damage to public health are not used. Furthermore, the consumption of meat must be reduced to a minimum, as the meat industry depletes many resources and contributes to the emission of large amounts of greenhouse gases.

Ninth: Some crops are more able to bear high temperatures, so in order to face successive waves of heat and drought, it is important to pursue the development of wheat that is more resistant to drought. We must also promote the cultivation of traditional crops that bear heat, require only a little bit of care, and can be grown organically, as these can achieve real economic, health and environmental benefits for the farmers. These crops include cactus, carob, dates, medicinal herbs and others.

Tenth: we must conduct research that will allow us to anticipate potential climate changes in our region and to therefore prepare to confront them. Agriculture will not suffer due to these changes by themselves, but will suffer mainly due to lack of appropriate readiness to face changes. We cannot know in advance whether we will face the same annual heat waves, for example, but the likelihood of them occurring is great. So, in the case that farmers know that there is a high probability of a heat wave, they can take precautions and pursue heat-resistant crop varieties.

Eleventh: We must accelerate energy efficiency in the design of buildings. We do not need to wait for the legislature to enact laws; modern technologies in this area facilitate the application of the green-building construction process that saves money and the environment.

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Climate Change in the Arab Countries

This study aims at outlining trends and indicators related to climatic infrastructure and reality in the Arab region in general, and in Palestine in particular. It also discusses existing policies and strategies, and makes further recommendations to address climate change on the Palestinian and Arab levels. In addition, the study proposes ideas, solutions and practical mechanisms to reduce carbon emissions within local economies and to encourage and promote the use of environmentally- and public-health-friendly energy alternatives.

This is the first Arab study of its kind in terms of comprehensiveness, professionalism, and the level of both theoretical and applied scientific content. The scientific background of the study is based on a combination of data from theoretical and applied research, and from practical-technical experience and expertise.



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