

Air Pollution Policy in Israel

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Since its establishment in 1948, the State of Israel has been oriented towards economic development and industrialization, with a transportation sector increasingly focused on private cars. In 1961, initial awareness of environmental risks led to the adoption of the Abatement of Nuisances Law, which served as the platform for air pollution policy for several decades, even as population growth and growth of the industrial sector, including fossil fuel power plants, led to a continuous increase in air pollution. In the early 2000s, the environmental movement in Israel criticized local air pollution policy as being out of date and started to promote a new Clean Air Law. The law, which was adopted in 2008 and came into force in 2011, was a watershed in air pollution policy in Israel. It includes ambient air quality values for 28 contaminants, emission permits for the industrial sector based on best available techniques (BAT), an enforcement system, and a unified and transparent monitoring system. This entry introduces the history of air pollution policy in Israel from 1948, through the 1961 and 2008 landmark legislations and their strengths and weaknesses, to the present. Also, it gives recommendations for future air pollution policy in Israel.

Keywords: air pollution ; Clean Air Act ; Clean Air Law ; Israel ; public policy ; regulation

1. Introduction

Exposure to air pollution is a leading cause of morbidity and mortality. Particulate matter in different sizes and with different chemical contents (e.g., nitrogen dioxide, sulfur dioxide, benzene) enters the human body primarily through the respiratory system, and causes respiratory, cardiovascular and cancer illness and death^[1]. In order to improve public health, nations adopt public policies to regulate air pollution from anthropogenic stationary sources such as industry and power plants, and mobile sources such as vehicles. In many countries, national air pollution policies consist of an overarching law such as the Clean Air Act in the U.S. and the Air Quality Directive in the European Union^{[2][3]}. Though costly, air pollution policy is cost-effective; the benefits, especially reduced morbidity, reduced premature mortality, and saved working days, outweigh the costs. For example, in the U.S., the annual economic value of reduced air pollution is estimated at 65 billion dollars in 2020, and the total economic value since 1990 has been approximately two trillion dollars^[4].

Established in 1948, and oriented towards development, industrialization and economic growth, Israel saw a continuous increase in air pollution before it started regulating this public health and environmental hazard. This paper reviews three phases in regulating air pollution in Israel: the first years (1948–1961), the legislation of the Abatement of Nuisances Law and the 47 years under that law (1961–2008), and finally the landmark legislation of Clean Air, Law including its main policy tools and case studies of the policy impact (2008–present). The paper concludes with current local issues and policy recommendations.

2. Three Phases in Air Pollution Policy in Israel

2.1. The First Phase: A Focus on Population and Economic Growth (1948–1961)

In the first decade after Israel was established, its population more than doubled, from 800,000 in 1948 to 2 million in 1958^[5]. The growth in population and the government's concurrent policy encouraging economic growth and modernization carried an environmental price tag. Fossil fuel power plants and industries were emitting increasing levels of air pollutants near populated areas, with no legislation to protect air quality^[6]. This changed in 1961, when the Abatement of Nuisances Law was ratified in the Knesset. Nicknamed the Kanovich Law, after the member of Knesset who initiated it, this law and its regulations enabled control of air pollution, noise and "strong and unreasonable" odors^[7]. However, the law was general, and mandatory ambient air quality values were only issued a decade later.

2.2. The Second Phase: Regulations under the Abatement of Nuisances Law (1961–2008)

In 1972, under the Abatement of Nuisances Law, mandatory values were set for eight pollutants including carbon monoxide (CO), hydrogen sulfide (H₂S), nitrogen oxides (NO_x), sulfur dioxide (SO₂), lead, and particulate matter (PM)^[8]. Enforcing this law was a challenge for both stationary and mobile emission sources. Authority for implementing the law was held by the Ministry of Health, which identified polluting factories but did not have the capacity to provide advice on lowering emissions. Similarly, with respect to vehicle emissions, protests by truck drivers supported by the Ministry of Transportation led to softer regulations that gave offenders 48 hours to tune their engines and meet the new sixty-Hartridge-unit standard, a practice which continued thereafter in order to pass the vehicle licensing test^[9]. For the first 20

years, the Ministry of Health and the Ministry of Interior, empowered to issue emission permits, were not proactive^[6]. In addition, several Ministries held parallel authority regarding air pollution policy, under different laws, including conflicting interests, such that the Ministry of Transportation held most of the authority regarding vehicle emissions^[9].

In the following years, several sets of regulations were adopted under the Abatement of Nuisances Law, including the 1972 regulations for the abatement of nuisances (air pollution from domestic waste oil heating); the 1990 regulations for the abatement of nuisances (prevention of air pollution and unreasonable odors from waste sites); the 1992 regulations for the abatement of nuisances (air quality)—the main ambient air quality values under the law; the 1998 regulations for the abatement of nuisances (prevention of air pollution and noise from quarries); and the 2001 regulations for the abatement of nuisances (air pollution from vehicles)^[10]. Some other regulations were adopted in parallel, for example, vehicle pollution regulations issued by the Ministry of Health under the Public Health Ordinance. Air pollution responsibilities were therefore divided between several ministries: the Ministry of Health, the Ministry of Transportation, the Ministry of Interior, and since its establishment in 1989, the Ministry of Environmental Protection (MoEP). These parallel ministerial authorities and parallel and sometimes inconsistent regulations, resulted in inefficient and inconsistent air pollution policy^{[6][10][11]}.

In the 2000s, policy interventions were implemented to reduce air pollution from major stationary sources. For example, during 2002–2011 three power plants in the large cities of Haifa, Tel Aviv, and Ashdod, were switched from high sulfur fuel oil to low sulfur fuel oil, and then to natural gas, in order to reduce sulfur emissions. A multi-city meta-analysis that assessed the health impacts of this intervention found a significant 13.3% reduction in cardiovascular mortality, and a marginally significant 19% reduction in all-cause mortality^[12].

While such steps improved air quality, the continuous increase in population, transportation and electricity demand contributed to increasing air pollution levels. According to a 2003 study, there were a thousand cases of annual excess mortality due to air pollution, and every fifth child in the Tel Aviv and Ashdod metropolises had a respiratory illness due to air pollution. In addition, emissions from factories exceeded mandatory values by tens of thousands of percentages. Air pollution became one of the major environmental health problems in Israel [9]. The MoEP attempted to advance updated regulations in 1996 but was not successful due to pressure from the private sector and compromised by adopting a voluntary agreement for implementing air pollutant values. The NGO, Israel Union for Environmental Defense (IUED, in Hebrew: Adam, Teva V'Din, literally Man, Nature and Law), opposed the voluntary agreement and demanded mandatory values. After several years of discussions, IUED took the MoEP to the Supreme Court, demanding mandatory standards, and the Supreme Court ordered the MoEP to act. In parallel, IUED drafted a Clean Air Law and advocated for it in parliament. Under these circumstances, the MoEP started negotiating with IUED regarding the Law [9]. Time was ripe for a comprehensive Clean Air Law.

2.3. The Third Phase: Clean Air Law (2008 onwards)

The Clean Air Law was prepared by a designated subcommittee of the parliamentary Internal Affairs and Environment committee, in collaboration with civil society (IUED), the private sector (the Manufacturers Association of Israel) and the Israel Electric Corporation. It was approved in Israel in 2008 and came into force on 1 January 2011. It is a landmark environmental law in Israel, and the first law dedicated to protecting air quality; other natural resources, including water, soil and the sea, had been protected by law decades earlier^{[9][13]}. This is a comprehensive law that covers mobile and stationary emission sources. It is based on the precautionary principle, as detailed in its objectives:

The purpose of this is to bring about an improvement of air quality and to prevent and reduce air pollution, inter alia by prescribing prohibitions and obligations according to the precautionary principle, all in order to protect human life, the health and quality of life of human beings and in order to protect the environment, including natural resources, ecological systems and biological diversity, for the public and for future generations and in consideration of their needs.

The Law was submitted to parliament as a private law proposal by 47 members of parliament. Later, the MoEP supported the law and played an important role in the legislative process, which took place in the designated subcommittee of the parliamentary Internal Affairs and Environment committee^[14].

The main policy tools in the Law are: authorization of the MoEP to set air quality values which are reviewed every five years (see below for details of the different sets of values); authorization of the MoEP to issue mandatory emission permits for factories, based on the best available techniques (BAT) principle; requirement of the MoEP to prepare a National Pollution Reduction and Prevention Action Plan; an enforcement system; tools for public participation in decision-making regarding air quality; and a unified and transparent National Air Monitoring Network (<https://www.svivaagqm.net>)^[14]. Moreover, the Law combines “hard policy tools” that include enforcement with “soft policy tools” that include merely obligations for reporting, known internationally to effectively reduce emissions^[15]. While the Clean Air Law is a major advancement in air pollution policy in Israel, it also includes lacunas, as detailed in the following sections.

2.3.1. Emission Permits: Is BAT Really the Best?

According to the law, major stationary emission sources are required to both comply with general regulations for reducing air pollution and obtain an emission permit from the MoEP. The emission permits are based on the BAT principle: polluters should minimize emissions as much as is technologically and economically feasible, even if the economic cost is higher

than the health benefit^[16]. Therefore, the emphasis is on requirements that are achievable at the time of issuing the permit.

Schorr^[17] argues that there is a flaw in the BAT principle in the law, since the law includes a consideration of costs and benefits which is inconsistent with minimizing emissions as much as possible, in section 19.b.9: “the cost and benefit of measures for the prevention of pollutant emission or its maximal reduction”^[18]. Schorr shows that the economic cost of the BAT is a consideration that the MoEP takes into account when issuing permits, even though this is contradictory to the BAT principle. On the other hand, the Manufacturers Association of Israel criticized the implementation of the BAT principle and claimed that BAT accepted in Europe is not acceptable in Israel^[19].

2.3.2. You Can't See the Law for the Values

The law includes four types of values: (1) target values: set according to public health safety and based on international standards such as those recommended by the World Health Organization. However, these values are not necessarily feasible in Israel at present and are therefore not mandatory; (2) ambient air quality values (environmental standards): mandatory values considered achievable at present, for 28 contaminants including PM_{2.5}, PM₁₀, gases, volatile organic compounds and heavy metals; (3) reference values for 89 contaminants, in addition to the air quality values, that are planned to be included in the target values, and (4) alert thresholds for emergencies. Target values, ambient air quality values and alert thresholds are set by the Minister of Environmental Protection, while reference values are set by the head of the Air Quality Division in the Ministry [18]. While the target values are typically lower than the ambient air quality values, when target values are feasible, they are identical. This is true, for example, for suspended particulate matter, several heavy metals in suspended particulate matter, annual SO₂, NO₂ and benzene, half-hour and 8 h CO, toluene, 1,3-butadiene and dichloromethane [14].

This set of four types of values has been criticized as complicated and not ambitious enough. Specifically, the mandatory ambient air quality standards are driven by technological and economic feasibility. The target values and reference values are based on public health considerations, but both remain a long-term vision without a timeline for adoption or implementation. Yet, both target and ambient air quality values are reviewed by law every five years. In the first revision in 2016, the MoEP updated values for trichloroethylene, benzene, cadmium and formaldehyde, and added ambient air quality values for 1,3-butadiene and mercury^[20].

Nonetheless, as of 2020, it is yet to be determined when the target values and reference values will become mandatory in the future. In contrast, in the U.S. for example, air quality standards under the Clean Air Act are set purely based on scientific knowledge of the levels needed for public and environmental health. This is true even if the levels are not technologically feasible at the time they are set, or, as the U.S. Environmental Protection Agency argued in the Supreme Court, if the economic cost outweighs the health benefits^[21]. However, the U.S. Environmental Protection Agency has recently proposed a rule advancing cost-benefit analysis for evaluating future rules under the Clean Air Act^[22].

Even though Israel adopted feasible values rather than the target values, a comparison of the Israeli, U.S. and European Union (EU) standards (Table 1) shows that the values are not significantly different: for CO, the 8 h value is identical in all three cases; for NO₂ the value is similar in all cases for hourly values, and higher in the U.S. for annual values; for ozone (O₃) it is similar in Israel and the U.S. and lower in the EU; for lead, lower in Israel than in the EU; for PM_{2.5} similar in all cases, for PM₁₀ the 24 h values are similar in Israel and the U.S. and much lower in the EU; and for SO₂ the values are significantly lower in the U.S. ^{[23][24][25]}.

Table 1. Comparison of standards for the six principal pollutants in Israel, the European Union and the U.S. All values are in µg/m³.

Pollutant	Time	Israel	European Union	U.S.
Carbon Monoxide (CO)	1/2 hour	60,000	-	-
	1 hour	-	-	40,000
	8 hours	10,000	10,000	10,000
Nitrogen Dioxide (NO ₂)	1 hour	200	200	188
	1 year	40	40	98
Ozone (O ₃)	8 hours	140	120	138

	1 hour	2	-	-
Lead (Pb)	3 months	-	-	0.15
	1 year	0.09	0.5	-
	24 hours	37.5	-	35
				Primary:
Particulate Matter PM_{2.5}				12
	1 year	25	25	Secondary:
				15
	24 hours	130	50	150
Particulate Matter PM₁₀	1 year	50	40	-
	1 hour	350	350	197
	3 hours	-	-	1.3
Sulfur Dioxide (SO₂)	24 hours	50	125	-
	1 year	20	-	-

2.3.3. Additional Regulation Gaps in Air Pollution Policy

Several additional lacunas have been identified in the Clean Air Law. These include:

Authority regarding transportation: The authority of the MoEP regarding mobile source emissions was compromised, and important responsibilities remained with the Ministry of Transportation, in conflict with other interests of this agency^[11]. Furthermore, gasoline-based private vehicles remain the dominant mode of transportation in Israel and, despite some progress, policy transition to electric, public and active transport (cycling and walking) remains low^[20].

National Pollution Reduction and Prevention Program: Under the law, the MoEP prepared a five-year national plan which was approved by the government in 2013 and includes several tools to reduce air pollution from transportation (private cars, taxis, buses) and electricity production. The original budget proposal was cut by the government by 80%, and it was not clear if the approved budget could fulfil the goals of the plan^[26]. The national plan was only partially implemented; the sections under the responsibility of the MoEP were implemented, while other sections under responsibility of the Ministry of Finance, regarding reducing private vehicle transportation and defining a differential tax rate for different fuels, were not implemented^[20].

Additional pollution sources: The Clean Air Law does not provide enough tools to control sources of pollution that are not in the industrial or transportation sectors. Specifically, quarries, open burning of mixed waste, dry waste and agricultural waste, intensive animal husbandry (cowsheds, chicken coops, sheep and goat houses and piggeries), and residential fireplaces and barbecues are sources of air pollution that are not adequately regulated^[27].

Indoor air pollution: The Clean Air Law does not refer specifically to indoor air pollution. There are regulations in Israel regarding prevention and monitoring of indoor radon [20], and in 2020 the green building standard SI5281 became mandatory. However, since in modern societies people spend about 90% of their time indoors^[28], there is room for further monitoring and regulations.

Limited public participation: The tools provided in the Law for public participation in decision making regarding air quality are inadequate, and de facto do not enable meaningful participation^[29].

3. Current Local Issues and Policy Recommendations

3.1. Current Local Policy Issues

The following are three key examples of local-level air pollution issues that remain on the policy-making agenda.

Haifa Bay: The Haifa metropolitan area in the north of Israel is home to over 500,000 residents and is the largest industrial area in Israel, with over a hundred factories including heavy industry, oil refineries, chemical factories, and a power plant, as well as a port and an airport. In 2015, the government approved a five-year Action Plan to Reduce Air Pollution and Environmental Risks in the Haifa Bay, including strict regulations of volatile organic compounds, increased supervision of industrial factories, a low emissions transportation zone, and vapor recovery at power stations. Over the past 20 years, following technological improvements and policy measures, air pollution levels in the Haifa Bay were reduced and are now similar to other metropolises in Israel. Yet, according to the State Comptroller, some factories still fail to meet the regulatory requirements, and the MoEP fails to pursue administrative enforcement such as sanctions^[26]. In June 2020, the MoEP declared it will promote removing the petrochemical industry from the Haifa Bay^[30].

Neot Hovav (formerly Ramat Hovav) is the national heavy chemical industrial zone in the south of Israel, including 19 factories and the national hazardous waste site. It belongs to an industrial regional council comprising representatives of the government, factories and bordering local authorities^[31]. Neot Hovav is surrounded by a 5 km environmental safety zone where no public uses of the land are allowed. However, about 6000 Bedouin citizens live within this zone in an "unrecognized village". Bedouins are semi-nomadic tribal Muslim Arabs, historically residing in the Middle East. Over 100,000 Bedouins, about a half of the Bedouin population in Israel, live in temporary towns considered illegal by the state, receiving no physical infrastructure, often referred to as "unrecognized villages"^[32].

Sde Barir: The site of a planned phosphate quarry near several towns in the south of Israel. An environmental impact assessment commissioned by the MoEP examined the impact on air quality and found that in the nearby town of Arad it will remain within the ambient air quality values. The Ministry of Health opposes the plan and states that future plans should comply with target values, and that a health impact assessment should be conducted. The assessment did not include impacts on air quality in nearby Bedouin towns. Following a lawsuit submitted by the local authorities and residents, the case is now in the Supreme Court^[33].

3.2. A Look into the Future and Policy Recommendations

The Clean Air Law, which came into force in 2011, is a landmark in air pollution policy in Israel that has made a major contribution to improvement of air quality, despite regulatory and implementation gaps^[26]. The implementation of the Law has improved public health and has also had economic benefits. Every dollar spent by industry in complying with the law produces national benefits of three dollars, mainly due to reduced morbidity and mortality^[19].

In 2012, the Clean Air Law was complemented by ratification of the Environmental Protection Law (emissions to the environment—reporting and registering duties), which led to the establishment of a national Pollutant Release and Transfer Register (PRTR). In 2018, over 570 factories reported to the registry, which is transparent and available online (<https://www.gov.il/he/departments/topics/prtr>)^[27]. As of 2020, air quality in Israel is monitored by the MoEP through a National Air Monitoring Network of over 150 monitoring stations, complemented by additional sampling of contaminants that cannot be monitored continuously^[14].

Nevertheless, there is a need for improved implementation, closure of regulatory gaps, solutions for local level air pollution issues, and additional policy measures, which could make a significant contribution to further improvement of air quality in Israel^[34]. In order to reach the health protective target values, set by the government, Israel should improve air policy and its implementation across all sectors. The following are policy recommendations to this end:

1. Set a timeline for adopting target values as mandatory.
2. Improved enforcement of the Clean Air Law in the industrial sector.
3. Inter-sectoral policy transitions to reduce air pollution: in the energy sector, towards renewable energies, particularly solar energy; in the transportation sector, towards less- and non-polluting modes of transport, such as public transportation, improved cycling and walking infrastructure, and electric cars.
4. Policy measures to reduce additional polluting sources such as quarries, illegal burning of solid waste, burning of agricultural waste, intensive animal husbandry, and smoke from domestic fireplaces.
5. Complete enforcement against polluters in general, and industry in the Haifa Bay in particular.
6. Advance the new government initiative to remove the petrochemical industry from Haifa Bay.
7. Aim for target values both in existing air pollution hotspots such as Haifa Bay, and planned ones such as Sde Barir.
8. Reach an agreement with the Bedouin living in the environmental safety zone around Neot Hovav regarding relocation.

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