



# The Dark Clouds of Pakistan

An Investigative Report on Air Pollution & Smog

**WORST AIR QUALITY  
PERSISTS IN  
LAHORE, 708 AQI**

**Pakistan Institute for Policy Research and Impact**

Empowering governments and businesses for a prosperous future and strategic growth

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# Pakistan's battle with pollution

## Urgent Call for Action

Pakistan's air quality crisis is a heart-wrenching tragedy, with Lahore ranking among the world's most polluted cities, its staggering Air Quality Index a constant reminder of the nation's despair. The once-pristine skies are now perpetually shrouded in toxic smog, choking its citizens and stealing their breath. Despite the authors' tireless efforts to sound the alarm, their pleas echoing through power corridors, the situation remains dire. Now, as a last resort, Author, Nadir Mumtaz, and Idrees Abbasi turn to the World Bank, UN, ADB, and International Court of Justice, begging for intervention to save their homeland from this suffocating menace. The cost of inaction is crippling, with tens of thousands of premature degradation. Will their cries be heard before it's too late?

**“Pakistan's air quality crisis is a heart-wrenching tragedy, with Lahore ranking among the world's most polluted cities”**



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## Basics of Air Quality

The Air Quality Index (AQI) was developed by the [University of Chicago \(EPIC\)](#), to provide a simple, uniform way to report daily air quality conditions. The [AQI numbers are determined by hourly measurements of five pollutants, fine particles, ground-level ozone, sulfur dioxide, nitrogen dioxide, and carbon monoxide](#). The pollutant with the highest AQI value determines the overall AQI for that hour. There are various institutions such as [IQ-Air](#), a Swiss company that measures air quality in real-time.

### The Alarming Reality of PM2.5

[Particulate matter 2.5 \(PM2.5\)](#) is a fine inhalable particle with a diameter of 2.5 micrometers or smaller. To put this into perspective, the average human hair is approximately 70 micrometers in diameter, making PM2.5 almost 30 times smaller. When inhaled, PM2.5 is absorbed deep into the bloodstream, increasing the risk of severe [health issues, including stroke](#), heart disease, lung disease, and cancer. The alarming reality is that PM2.5 poses the greatest health threat among all air pollutants, emphasizing the need for urgent action to mitigate its effects.

### Pakistan's Alarming Air Quality Crisis

[The 2024 Environmental Performance Index \(EPI\)](#), published by Yale University, ranked Pakistan 178th out of 180 countries in air quality, assigning a score of just 6.3 points. Similarly, the [2023 IQAir World Air Quality Report](#) revealed that Pakistan's annual average PM2.5 concentration was 73.7  $\mu\text{g}/\text{m}^3$ —over 14 times higher than the [World Health Organization's \(WHO\)](#) recommended annual guideline of 5  $\mu\text{g}/\text{m}^3$ . These alarming statistics underscore the severity of Pakistan's air pollution crisis, highlighting the urgent need for comprehensive mitigation strategies to address the escalating health and environmental challenges.

### The Socio-Economic Consequences of Air Pollution in Pakistan

The World Bank has conducted a comprehensive analysis of the economic impact of air pollution in Pakistan. According to their estimates, the annual cost of air pollution in Pakistan exceeds a staggering [\\$47 billion](#). This substantial economic burden is primarily attributed to the severe health implications of air pollution, which have far-reaching consequences for the country's population and economy.

### Health Implications and GDP Impact

A striking statistic reveals that the health implications of air pollution account for a significant [5.9% of Pakistan's Gross Domestic Product \(GDP\)](#), as reported in 2013 by World Bank. This alarming figure underscores the critical need for effective policies and interventions to mitigate the devastating effects of air pollution on human health and the national economy.

### Mortality Rates and Environmental Factors

The World Health Organization's (WHO) Global Health Observatory has estimated that environmental factors, including air pollution, are responsible for approximately [200 deaths per 100,000 population](#) in Pakistan.

## Executive Summary

The smog in Pakistan and South Asia at large is a complex mixture of pollutants, primarily composed of, Particulate Matter (PM2.5 and PM10), Nitrogen Oxides (NOx), Sulfur Dioxide (SO2), Carbon Monoxide (CO), pollen, dust, and ammonia gas, Volatile Organic Compounds (VOCs) and [Secondary Pollutants](#) such as Ground-Level [Ozone \(O3\)](#), and Secondary Particulate Matter, These pollutants combine to form the toxic smog that affects Pakistan, posing significant health risks to its citizens.

The data in emission inventories for Khyber Pakhtunkhwa (KPK), Punjab, and Lahore provide essential insights into environmental challenges. These inventories detail the sources and scale of emissions contributing to climate change and air pollution, forming a foundation for developing targeted mitigation strategies. By identifying specific contributors across sectors, such as transportation, industry, and agriculture, policymakers can implement more effective measures to reduce emissions and protect public health. The following tables illustrate the emission profiles for these regions, emphasizing the urgency of action to curb environmental degradation.

	Transport	Industries	Crop Residue Burning)	Waste Burning	Commercial	Domestic
Emissions Inventory of KPK <sup>[1]</sup>	85%	7.9	3.90%	4.3 %	0.48 %	1.9 %
Emissions Inventory of Lahore	83.15%	9.07%	3.90%	3.63%	0.14%	0.11%

The available emission inventories reveal that vehicle emissions are the primary culprit behind the worst air quality in Lahore and Khyber Pakhtunkhwa (KPK), with Punjab's data indicating that vehicular emissions are a major contributor to air pollution and smog, despite some of the inventory data being nearly seven years old.

	Transport	Industry	Energy	Agriculture	Non – combustion Industrial Processes	Others
Emission Inventory of Punjab <sup>[2]</sup>	39%	24%	16%	11%	9%	1%

The vehicular emissions are predominant factors in making the worst air pollution and smog in Pakistan; diesel and petrol typically have a high quality of sulfur and benzene and other harmful material. The high sulfur content significantly influences particulate matter (PM) emissions during the combustion of fuel oil. Efforts to reduce sulfur levels in fuels have faced repeated delays. It was first decided in the year 2008 to introduce Euro 5, a fuel standard that helps reduce harmful vehicular emissions. However, so far [OGRA \(Oil and Gas Regularity Authority](#) and [Ministry of Petroleum](#) have failed to force local oil [refineries to upgrade](#) those, while China and India, once facing severe vehicular emissions now turned to Euro 6. Pakistan can only upgrade its long-awaited target of upgrading its refineries only by your advice.

No external funding is required but looking at the table below, the quantity of CO, HC, NOx, PM, and Sulfur limit (ppm) will reduce tremendously ;

Stage	Date of Implementation	CO	HC	NOx	PM	Sulfur limit (ppm)
Euro I	1992	4.5	1.1	8	0.612	600
Euro VI	2013	1.5	0.13	0.4	0.01	10

- Government findings in 2024 revealed that illicit [Iranian diesel and petrol account for 30-40% of Pakistan's](#) fuel consumption. These subpar fuels harbor high sulfur content and toxic contaminants like manganese and xylene, gravely endangering public health and the environment. How to stop this highly polluted Iranian fuel is a major concern for the government, but it is feasible and the government must control smuggling if it hopes to prevent this environmental catastrophe. The US and the Global community imposed sanctions on Iran because of which Iran could not upgrade its oil refineries. Consequently, this low-quality petrol and diesel caused a loss of almost one billion dollars to the economy on account of taxes alone.
- One of the most serious issues of toxic vehicular emissions is unprecedented [Adulteration in fuel because of which](#) the transport sector in Pakistan is a main contributor to the release of toxic pollutants, including carbon monoxide (CO), nitrogen oxides (NO<sub>x</sub>), sulfur dioxide (SO<sub>2</sub>), particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>), and volatile organic compounds (VOCs) such as benzene and toluene, both recognized as potent carcinogens. These emissions pose severe risks to human health while acting as precursors to ground-level ozone (O<sub>3</sub>) formation and the amplification of particulate matter concentrations. Vehicular emissions of NO<sub>x</sub>, SO<sub>x</sub>, and CO undergo atmospheric transformations into secondary pollutants, collectively contributing to the photochemical haze commonly referred to as Los Angeles smog or, more broadly, as smog.
- While working at the watchdog over Pakistan's energy sector, I witnessed the appalling truth: not a single petroleum station meets fuel specifications, poisoning the nation with toxic substances. Determined to combat this environmental catastrophe, I with my engineer son proposed a revolutionary web-based [real-time monitoring system to OGRA, ensuring 100% compliance](#). But our noble quest turned into a nightmare. We faced a life-threatening backlash from OGRA and the Ministry of Petroleum, forcing me to surrender with an unconditional apology (Annexure A). The corrupt system had silenced us. Today, I earnestly appeal to the global community to help save Pakistan from this environmental catastrophe that threatens to destabilize its economy. **I urge you to press the Government of Pakistan to implement a real-time monitoring system across the entire fuel supply chain. This system should ensure both the quality and quantity of fuel, extending to mandatory monitoring at all petrol pump stations. Additionally, such a system would aid in auditing fuel distribution, preventing illegal storage, and eliminating hoarding practices.**
- .This system will meet the consumer's long-lasting demand, who are deprived of the quantity of fuel, which is mixed impurities.
- Pakistan's gas sector, overseen by OGRA, is struggling with declining domestic natural gas production while LPG consumption rises, now accounting for 1.5% of the energy mix. Despite consuming over two million tons of LPG annually, only 40% is locally produced, with

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the rest smuggled across land borders. These imports, often of low quality from outdated refineries, worsen air pollution and smog. In Sindh and Punjab, [LPG is adulterated with CO<sub>2</sub>](#), increasing risks of hazardous accidents, allegedly facilitated by local authorities and OGRA.

- I advised the Government of Punjab to tackle methane emissions from biomass and organic waste by converting them into diverse transport fuels such as CNG, diesel, methanol, and aviation jet fuel. Furthermore, these resources could be utilized to produce dimethyl ether, a heavy condensate gas that can effectively replace LPG as cooking fuel across Punjab and Pakistan. This practical and sustainable solution has the potential to make Pakistan self-sufficient in energy and provide a cleaner fuel alternative. Regrettably, this recommendation was dismissed and overlooked.
- One of the major contributors to smog and air pollution in Pakistan is the extensive use of imported coal in brick kilns, the cement industry, and other general industries. This practice exacerbates environmental degradation and imposes a financial burden on the country, costing Pakistan nearly \$2 billion annually. This proposal was put in the trash too. (*Annexure C*)
- ☒ In December 2023, I made a practical proposal to the government through OGRA that now after phenomenal growth of roof-top solar systems, electricity consumers sending extra units to the national grid which is creating circular debt so all such consumers must be advised to use these units for the cooking at the electric stove, which will not only save import of LNG and LPG but also help to reduce the air pollution and smog too, yet this proposal is pending with the table of Minister petroleum. This is an opportunity to make [Punjab and Pakistan at large the first model in the whole globe model of NET-ZERO](#). The UN defined it, as net zero means cutting carbon emissions to a small amount of residual emissions that can be absorbed and durably stored by nature and other carbon dioxide removal measures, leaving zero in the atmosphere.
- Yet, this most simple doable proposal which can be implemented with zero cost to the government has been pending for the last year, with Minister of Petroleum. (*Annex-D*).
- It is disheartening to note that while Pakistan has set an ambitious target of reducing its projected emissions by 50% by 2030, the reality paints a starkly different picture. Recent data from EDGAR, supported by the European Commission, reveals alarming statistics: Pakistan's total greenhouse gas (GHG) emissions surged to 546 million tons annually in 2022, a sharp increase from 307 million tons per year in 2002. This troubling trend underscores the urgent need for effective strategies and accountability to achieve its climate commitments.
- This alarming score underscores the necessity for integrating all climate change funding for Pakistan with a robust real-time monitoring system to measure greenhouse gas (GHG) emissions—a technically feasible solution. It is imperative to move beyond mere advocacy and ensure that donor funds are directed toward tangible, on-ground initiatives that effectively reduce GHG emissions, rather than perpetuating a cycle of expenditure without accountability or measurable impact.
- In July 2020, the Cabinet Division of the Government of Pakistan constituted an inquiry commission (Notification No. 01/05/2020, Annex D) to investigate the ineffectiveness of OGRA, the National Oil Regulator, and the Hydrocarbon Development Institute of Pakistan (HDIP). The commission highlighted extensive collusion between these entities and oil marketing companies, leading to widespread fuel adulteration—a practice with severe

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environmental repercussions, including escalating air pollution, smog, and public health crises. One of the key recommendations was to dissolve OGRA and HDIP due to their failure to regulate effectively. Unfortunately, the influence of powerful adulteration cartels thwarted these recommendations, allowing the illegal fuel adulteration business to persist at a tremendous environmental and societal cost.

- As of January 2024, Pakistan's combined circular debt reached an alarming PKR 5.4 trillion, pushing the nation closer to economic collapse. This staggering figure underscores the complete failure of the country's Oil and Gas (OGRA) and Electricity regulatory (NEPRA) authorities. Their inefficiencies and inability to ensure effective governance have significantly contributed to the nation's economic turmoil. Without these regulatory shortcomings, Pakistan could have been on a path to prosperity, free from the crippling burden of circular debt.

### Smog and Air Quality: How Punjab is Responding to the Crisis

The Government of Punjab (GoPu) has launched various initiatives to tackle air pollution, including large-scale media campaigns, imposing fines on polluters, restricting outdoor activities, and enhancing air monitoring systems. These actions also involve bans on non-compliant industrial units and mandating air purifiers in shopping malls. However, the focus remains reactive, dealing with immediate symptoms rather than addressing root causes. The Government of Punjab's emphasis on media presence and visibility underscores a concerning ignorance of the root causes of air quality issues and smog. This reflects a significant lack of expertise in addressing climate change effectively. A singular focus on advocacy not only undermines economic activity but also deals a severe blow to an already struggling economy. Excessive reliance on media campaigns appears more aligned with political point-scoring than with implementing sustainable, impactful solutions to combat environmental challenges.

### Recommendations

1. The author, after closely analyzing the performance of OGRA and NEPRA, strongly advocates transformation of these regulatory bodies into AI (Artificial Intelligence) driven systems. This transformation should involve active oversight by World Bank and IMF representatives, as these organizations were instrumental in establishing these authorities for the benefit of Pakistan's 250 million citizens. Such modernization is crucial to enhancing efficiency, transparency, and accountability in the energy and regulatory sectors.
2. To address smog and air pollution effectively, it is imperative to upgrade all refineries in Pakistan to produce Euro-6 compliant fuel. Euro-6 fuel significantly reduces harmful emissions, including particulate matter (PM) and nitrogen oxides (NOx), thereby improving air quality and mitigating health risks associated with air pollution. Transitioning to this cleaner fuel standard is a critical step toward meeting international environmental benchmarks and safeguarding public health. This is only possible when international institutions like UN, IMF, World Bank, ADB and UNDP

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put pressure on the government of Pakistan. How can GOP can demand for the funds for the climate Change when utterly failed to introduce Euro- 6 fuel in Pakistan?

3. As recommended in paragraph 21.3, page 148, of the inquiry commission's report, established by the Cabinet Division (Notification No. 01/05/2020 Lit-III, dated July 28, 2020), the dissolution of OGRA should be executed through an act of Parliament within one month. The authority's alleged nexus with fuel adulterators has rendered it ineffective, contributing significantly to widespread air pollution and smog. **The government now faces a critical choice: retaining OGRA or prioritizing the right to clean air for Pakistan's 250 million citizens.**
4. Similarly, the appointments of the DG Oil, DG Gas, Secretary Petroleum, and Minister of Petroleum must be conducted based on merit and with the involvement of reputable international institutions such as the IMF, World Bank, and the UN. The Government of Pakistan must recognize that achieving transparency within the Ministry of Petroleum is unlikely without the oversight and input of these organizations. Until such measures are taken, the people of Pakistan will continue to suffer from deteriorating air quality and its devastating consequences.
5. Real-time monitoring system of Diesel, Petrol and LNG must be installed to ensure both the quality and quantity of the fuel but under the surveillance of the international institutions. This is only possible when the international institutions will directly also monitor the selection of honest HR at the ministry and OGRA. In the presence of incumbent HR it is impossible to introduce the real-time monitoring system for fuel or up-gradation of oil refineries.
6. Now that the surplus electricity is available, households supplying extra power to the national grid should have their natural gas connections discontinued. This measure would not only reduce circular debt but also significantly improve air quality. I highlighted this proposal in an [op-ed 23<sup>rd</sup> Feb 2024 to exhort OGRA and ministry of petroleum](#) to implement this policy. Unfortunately, both institutions have resisted due to the overwhelming influence of LNG and LPG import lobbies, which prioritize profits over environmental and economic reform.
7. Methane emissions, a significant contributor to smog and air pollution. Pakistan is a major contributor to global methane emissions. The majority of Pakistan's methane emissions come from agriculture and waste. Methane can be harnessed and converted into various transport fuels, including CNG, diesel, methanol, and even aviation jet fuel. Additionally, methane can be used to produce dimethyl ether, a heavy condensate gas that has the potential to replace LPG as cooking gas across Punjab and Pakistan. This approach not only addresses methane emissions but also provides an alternative, more sustainable energy source for the country.

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## Acknowledgment

I extend my heartfelt gratitude to Nadir Mumtaz, President of the Pakistan Institute for Policy Research and Impact (PIPRI), a USA-based, non-political, non-partisan think tank specializing in international economic development, trade, investment, and technology. PIPRI is honored that Imtiaz Gul and Engineer Idrees Abbasi are among the founding members of this distinguished institution.

PIPRI is envisioned as a global forum fostering effective policy dialogue and capacity-building among developing nations on critical economic issues. Through its extensive network spanning five continents, PIPRI works to strengthen policy coherence on international economic matters and enhance the development partnership framework. It serves as a beacon for advancing global and regional economic cooperation.

The think tank boasts a remarkable roster of esteemed intellectuals and experts, including top economists like Dr. Shahida Wazarat, Senator Engineer Rukhsana Zuberi (former Chairperson of the Pakistan Engineering Council), Mr. Augustine (President, PIPRI North America), Ambassador Iftikhar Kazmi, Air Marshal M. Ashfaq Arain (Retd.), Dr. Syed Raghob Abbas Shah (former WAPDA Chairman), Barrister Shahida Jamil (former Law Minister of Pakistan), Naveed Ashraf Raja, Kamran Arshad chairman of the All Pakistan Textile Mills Association (APTMA), Dr Ahmed Kamal, Dr. Engineer Sohail, Lt. Gen. Amjad Shuaib, Dr. Ashfaq Hassan Khan, Najeeb Abbasi, Afia Salam, Asif Inam former chairman APTMA, Brigadier Rashid Wali Director Operation IPPRI, Khalid Mustafa and many more—totaling over 250 members.

These distinguished intellectuals of South Asia are united in their unwavering commitment to transforming Pakistan into an economic powerhouse while safeguarding its economic, energy, food, and water security. Their collective vision and dedication extend to addressing the pressing challenges of climate change, inspiring hope for a prosperous, resilient, and sustainable future for Pakistan.

A special note of gratitude goes to Engineer Idrees Abbasi for conducting an on-ground survey of petrol quality and quantity in Karachi, all while diligently fulfilling his responsibilities as a consultant for the World Bank. His efforts exemplify unwavering dedication and commitment to addressing critical challenges.

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# List of Acronyms

GJ	Giga-Joules
AOD	Aerosol Optical Depth
AQI	Air Quality Index
AURI	Acute Upper Respiratory Infections
BC	Black Carbon
CAMx	Comprehensive Air Quality Model with Extension
CH4	Methane
CO	Carbon Monoxide
EDGAR	Emission Database for Global Atmospheric Research
EEA	European Environment Agency
EI	Emission Inventory
EMEP	European Monitoring and Evaluation Program
FAO	Food and Agriculture Organization
g	Grams
GAINS	Greenhouse Gas Air Pollution Interactions and Synergies
GAPF	Global Atmospheric Pollution Forum
Gg	Giga-Grams
GJ	Giga-Joules
Gt	Giga-Tons
ha	Hectares
IPCC	Intergovernmental Panel on Climate Change
Kg/m <sup>3</sup>	Kilogram per cubic meter
MtCO <sub>2</sub> -eq	Metric tons of CO <sub>2</sub> equivalent
µm	micrometer
µg/m <sup>3</sup>	Micro-grams per cubic meter

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## Air Pollution: A Growing Global Environmental Threat

Air pollution represents one of the most significant environmental challenges globally, impacting human health, agriculture, natural ecosystems, and climate patterns. The severity of its effects is projected to escalate in the coming decades. Air pollutants, including aerosols and gases, are especially concerning due to their transboundary nature. These pollutants often originate in one country but travel across borders via air masses, impacting regions where they were neither produced nor utilized.

These pollutants disrupt Earth's energy balance, alter rainfall patterns, and cause unexpected temperature fluctuations, such as heat waves. Additionally, several global studies have demonstrated that atmospheric aerosols, such as black carbon and dust, deposited on snow and glaciers reduce their albedo (reflectivity). This leads to enhanced absorption of solar radiation, accelerating the melting rates of High Asia glaciers, including those in the Tibetan Plateau, Himalayas, and Karakoram.

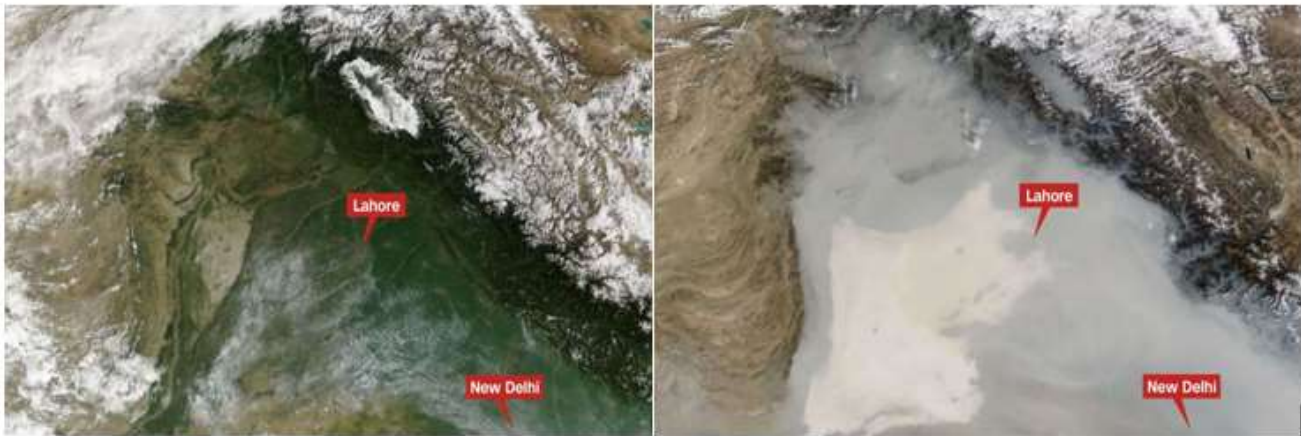
Moreover, air pollutants like carbon monoxide (CO), sulfur dioxide (SO<sub>2</sub>), and ozone (O<sub>3</sub>) pose severe health risks. According to the World Health Organization (WHO) in September 2021, over 80% of the global population is exposed to air quality levels exceeding WHO's safe limits, contributing to more than three million deaths annually. Consequently, addressing air pollution has become a critical global priority, offering significant co-benefits for climate, environmental conservation, and socio-economic development.

### Air Pollution in Pakistan

Winter air quality deteriorates significantly due to the colder, drier air, which traps pollutants close to the ground instead of allowing them to dissipate as warmer air does. This phenomenon creates a hazardous buildup of toxins in the atmosphere, compounding the environmental and health crises. Striking satellite images capture record-breaking levels of thick, toxic smog enveloping eastern Pakistan and northern India.

Pakistan ranks among the countries most severely impacted by air pollution, a pervasive issue with far-reaching consequences for human health, agriculture, and ecosystems. Every winter, a menacing yellow haze blankets the skies across Punjab province, driven by a combination of factors including emissions from coal-fired power plants, vehicular pollution, stagnant atmospheric conditions, and the burning of agricultural waste by farmers as reported by the government of Punjab.

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*Satellite imagery from NASA Worldview shows heavy smog over Pakistan's Punjab province and parts of northwest India on November 10, 2024, compared to the same region on August 31, 2024. NASA Worldview/CNN*

NASA Worldview imagery shows an expansive gray cloud stretching across Pakistan's Punjab province, extending eastward over northern India, including the capital New Delhi, and beyond. Punjab, Pakistan's most populous province, is home to two-thirds of the country's population and contributes approximately 60% to Pakistan's annual industrial goods and services. However, the rapid industrialization, vehicular emissions, biomass burning, and urbanization in Punjab are major Air pollution levels in Pakistan have reached unprecedented and hazardous levels, with cities like Lahore and Multan now dominating global rankings for the worst air quality. According to the Swiss monitoring group IQAir, which collects data from 14 regional stations, Lahore was rated the most polluted city in the world on November 7, 2024. The city's Air Quality Index (AQI) soared to an alarming 1165—over 120 times the safe levels recommended by the World Health Organization (WHO). Adding to the crisis, Multan has emerged as a close contender. On November 9, 2024, Multan recorded an astonishing AQI of 1914, marking its second consecutive day as the world's most polluted city. These figures are a stark indicator of the severe air quality degradation affecting Pakistan, particularly in densely populated regions.

Causes and Consequences of Smog in Punjab and Pakistan at Large

Smog, a significant air quality issue in Punjab, is primarily caused by:

- **Crop Burning:** Farmers burn agricultural residues, releasing harmful pollutants.
- **Industrial Emissions:** Rapid industrial expansion with insufficient environmental controls.
- **Vehicular Emissions:** Increasing numbers of vehicles using poor-quality fuels.
- **Brick Kilns:** Traditional brick-making practices that rely on coal and biomass fuels.
- **Deforestation:** Loss of tree cover exacerbates air quality issues.

## Chapter 2

# Breathing Toxicity: Pakistan's Smog Crisis and Euro 5 Non-Compliance

Smog is a scientifically recognized phenomenon distinguished by a brownish haze resulting from the chemical interactions of various air pollutants. Key contributors to smog formation include nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), sulfur compounds, particulate matter (PM), and non-methane volatile organic compounds (NMVOCs). These pollutants undergo photochemical reactions in the presence of sunlight, producing ground-level ozone and other secondary pollutants. This process leads to the development of smog, which poses significant threats to environmental quality, human health, and visibility.

To reduce air pollution from vehicles and improve air quality, the first vehicle emissions standards were enacted in 1963 in the United States, mainly as a response to Los Angeles' smog problems. Three years later Japan enacted their first emissions rules, followed between 1970 and 1972 by Canada, Australia, and then European Union. The early standards mainly concerned carbon monoxide (CO) and hydrocarbons (HC). Pakistan opted Euro standards which were first introduced in 1992, with Euro I, and have since evolved through several iterations, each with progressively stricter limits on emissions, and later on other standards were introduced and implemented as shown in the table below for passenger cars and light commercial vehicles, and later extended to heavy-duty vehicles.

Stage	Date of Implementation	CO	HC	NO <sub>x</sub>	PM	Sulfur limit (ppm)
Euro I	1992	4.5	1.1	8	0.612	600
Euro II	1996	4	1.1	7	0.25	500 (diesel)
Euro III	1999	1.5	0.25	2	0.02	350 (diesel); 150 petrol
Euro IV	2005	1.5	0.46	3.5	0.02	50
Euro V	2008	1.5	0.46	2	0.02	10
Euro VI	2013	1.5	0.13	0.4	0.01	10

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The Euro standards regulate several key pollutants emitted by internal combustion engines. The main pollutants targeted by these standards include:

- **Nitrogen Oxides (NO<sub>x</sub>):** NO<sub>x</sub> emissions are a major contributor to air pollution and have significant health impacts, including respiratory problems and the formation of ground-level ozone.
- **Carbon Monoxide (CO):** CO is a colorless, odorless gas that can be harmful when inhaled in large amounts. It can cause dizziness, confusion, and even death at high concentrations.
- **Hydrocarbons (HC):** Unburned hydrocarbons contribute to the formation of ground-level ozone and smog, which can have severe health and environmental consequences.
- **Particulate Matter (PM):** PM consists of tiny particles that can penetrate deep into the lungs and even enter the bloodstream, causing a range of health issues from respiratory problems to cardiovascular diseases.

Pakistan's adoption of the European vehicle emission standards, Euro II, in 2012 highlights a significant delay in aligning with global emission norms. This adoption occurred 12 years after Euro II was globally phased out, while Europe is now transitioning to the more stringent Euro VII standards. In stark contrast, neighboring India implemented Bharat Stage VI standards (equivalent to Euro VI) for all vehicles manufactured from April 1, 2020.

The continued reliance on the outdated Euro II standard in Pakistan has exacerbated vehicular emissions, including nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), non-methane volatile organic compounds (NMVOCs), sulfur oxides (SO<sub>x</sub>), total suspended particulates (TSP), and fine particulate matter (PM<sub>2.5</sub>). These pollutants significantly degrade air quality, contributing to health hazards, environmental damage, and the formation of smog.

Smog, a scientifically established phenomenon, manifests as a brownish haze resulting from the chemical interactions of air pollutants. Specifically, pollutants like nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO), particulate matter (PM), and NMVOCs react under sunlight to produce ground-level ozone and other secondary pollutants, intensifying smog conditions.

For instance, in Lahore, the emissions inventory from various sectors, as reported by the Government of Punjab (GoPu), highlights the role of fuel types in determining sectoral emissions. The data underscores the urgent need for cleaner fuels and stricter compliance with modern emission standards to mitigate the harmful impacts on air quality, public health, and ecosystems.

Concentration of Pollutants (Tons) from different sectors							
Emissions (Tons)	Transport	Industry	Agriculture (Crop Residue Burning)	Waste Burning	Commercial	Domestic	Emissions Total
NO <sub>x</sub>	3,390	2,296	158	240	142	104	6,330
CO	101,820	258	4,582	4,220	62	44	110,987
NM VOC	21,440	20	34	90	4	3	21,591
TSP	170	138	398	350	1	2	1,060
PM <sub>2.5</sub>	397	29	371	320	1	1	1,120

The results indicate that the transport sector is the leading contributor to Lahore's deteriorating air quality. Non-methane volatile organic compounds (NMVOCs) and nitrogen oxides (NO<sub>x</sub>) are the second most significant pollutants, primarily emitted by the transport and industrial sectors. The data also quantifies emissions of fine particulate matter, including total suspended particulates (TSP), PM<sub>2.5</sub>, and PM<sub>10</sub>. These particulates act as condensation nuclei, playing a critical role in the formation of smog during Lahore's winter months.

## High Quantity of sulfur

In Pakistan, diesel and petrol typically have a sulfur content averaging around 3%. This high sulfur content significantly influences particulate matter (PM) emissions during the combustion of fuel oil. Efforts to reduce sulfur levels in fuels have faced repeated delays. Originally, the maximum allowable sulfur content for fuels was to be reduced from 10,000 parts per million (ppm) to 500 ppm by 2008. However, the stricter standard was postponed first to 2010 and then again to July 1, 2012, primarily due to the need for more time to retrofit refineries.

The Federal Government further extended the deadline to lower sulfur content in fuels to December 2017. Unfortunately, refinery upgrades have been grossly neglected, both by the refineries themselves and the Ministry of Energy, Petroleum Division (MoEPD). All five refineries in the country continue to operate with outdated hydro-skimming or semi-conversion technology. Even BYCO, which was commissioned in 2004, relies on this antiquated hydro-skimming technology. As a result, the refined petroleum products in Pakistan meet only the outdated EURO II standards and are limited to RON 87 and RON 91 grades, both of which have been obsolete globally for years.

More recently, the Petroleum Division and the Oil and Gas Regulatory Authority (OGRA) missed a crucial deadline set by the Special Investment Facilitation Council (SIFC) to address tax exemptions and extend refinery upgrade agreements. This deadline, initially set for November 10, 2024, was part of a directive aimed at bolstering Pakistan's refinery sector amidst growing concerns over smuggling and unresolved tax issues.

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**THE CASE OF CHINA-** I have seen once Beijing was one of the top polluted cities in the World in the mid-nineties, other than replacing subcritical coal power plants with ultra-support critical power plants, China has used several strategies to control air pollution from transportation, including, sitting of the emission standards. China has implemented a series of emission standards for vehicles, including the China 5 and China VI standards, which are similar to or more stringent than European standards:

**China 5:** This standard is similar to the Euro 5 standard but with some differences. It has stricter emission limits for diesel light-duty vehicles (LDVs) and sets PM emission limits for gasoline LDVs.

**China VI:** This standard is more stringent than the Euro 6 standard and includes a real-world emission testing protocol. It's expected to reduce emissions from heavy-duty vehicles by 82% for PM2.5 and 86% for NOX by 2030.

**THE CASE OF INDIA.** India has taken several steps to reduce air pollution from transportation, including, introducing Bharat Stage Emission Standards (BSES): While Pakistan refineries are still struck at Euro-2, Bharat Stage IV (BS-IV), which is equivalent to Euro IV, emission standards were implemented in India on April 1, 2017

These standards regulate vehicular emissions and are largely based on European (EURO) standards. India implemented BS-VI standards in 2020, which are similar to EURO-6/VI norms.

## Conclusions

**Tragic Tale of Neglect: Ministry of Petroleum and OGRA's Catastrophic Failure**

Fourteen long years have passed, yet the Ministry of Petroleum and OGRA stand culpable, their inaction a stark reminder of managerial incompetence.

**A Legacy of Neglect**

Failure to implement Euro VI standards for vehicle fuels has unleashed:

- Toxic air quality
- Widespread devastation
- Unrelenting suffering

**Consequences of Inaction**

- Choked lungs
- Poisoned skies
- Shattered lives
- A nation's health betrayed

**Echoes of Indifference**

Ministry of Petroleum and OGRA's silence hangs heavy, punctuated only by:

- Empty promises
- Unfulfilled commitments
- Persistent disregard

**Pakistan's Plea**

Will those responsible awaken to:

- 
- The cries of afflicted citizens?
  - The looming environmental disaster?
  - The imperative for change?

#### Transformation Through Intervention

- The current state of affairs in Pakistan's petroleum sector necessitates radical change. Business as usual will never yield solutions; instead, transformative intervention is crucial.

#### The Need for Global Community Intervention

- Only through concerted global community efforts can Pakistan break free from:

- Inefficient governance

- Corruption

- Incompetence

#### Revitalizing Key Institutions

- True progress depends on installing: Credible professionals, Capable leaders

- Transparent systems Within: Oil and Gas Regulatory Authority (OGRA) and Ministry of Petroleum

#### Consequences of Inaction

- Failure to intervene will perpetuate, the Environmental degradation, Economic stagnation and Public suffering

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## LPG Adulteration: The Hidden Menace behind Pakistan's Smog

The Oil and Gas Regulatory Authority (OGRA) oversees Pakistan's gas sector, including Liquefied Petroleum Gas (LPG), Natural Gas, and Compressed Natural Gas (CNG). However, domestic natural gas production is declining at 8-10% annually. Meanwhile, LPG is growing rapidly, accounting for 1.5% of Pakistan's energy mix.

Pakistan consumes over two million tons of Liquefied Petroleum Gas (LPG) annually, yet local production accounts for only 40% of this demand. To fill the gap, approximately 40% of LPG imports enter through land borders, predominantly via Taftan, Gadd, and Mand. This influx, largely unregulated, raises significant concerns about quality and safety. The imported LPG contains hazardous impurities, due to its origin in outdated refineries across the border. The absence of robust quality checks has allowed these low-quality products to flood the market, exacerbating Pakistan's already critical air quality issues. The unchecked adulteration of LPG not only worsens smog but also poses serious health and environmental risks.

In Sindh and Punjab, LPG adulteration with carbon dioxide (CO<sub>2</sub>) is rampant, allegedly facilitated by the collusion of the Hydrocarbon Development Institute of Pakistan (HDIP), local administrative authorities, and OGRA. CO<sub>2</sub> is injected into tankers to artificially increase pressure for improved vaporization, a hazardous practice that has resulted in fatal accidents too.

Research by esteemed institutions such as the Environmental Protection Agency (EPA, USA) and the International Energy Agency (IEA) (2020) underscores the dangers of such practices. Combustion of hydrocarbons like natural gas, oil, or coal typically produces carbon dioxide (CO<sub>2</sub>) as the main byproduct when oxygen combines with these fuels. However, incomplete combustion—caused by insufficient oxygen supply or low temperatures—results in the production of carbon monoxide (CO), a highly toxic and harmful byproduct. This dual threat from CO<sub>2</sub> adulteration and CO emissions highlights the urgent need for stringent action to check quality assurance in Pakistan's LPG sector.

NASA underscores the pivotal role of carbon monoxide (CO) in atmospheric chemistry, as it contributes to the formation of ground-level ozone and urban smog, which degrade air quality and impair the atmosphere's natural cleansing mechanisms.

Beyond CO<sub>2</sub> adulteration, LPG coming through the border contain other impurities as well such as, ethylene, propylene, styrene, sulfur compounds, oily residues, amines, benzene, and toluene are also prevalent, further exacerbating environmental degradation and posing serious health risks. These contaminants highlight the urgent need for stringent quality control measures and regulatory oversight to address the deteriorating air quality due to the unchecked adulteration of LPG. Filling of LPG from Cylinder to Cylinder at the distributor premises of LPG marketing companies or at any other unauthorized place/shop normally doing illegal decanting- This results in several LPG fire-related

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accidents have been reported countrywide during the last couple of years due to illegal decanting and adulteration. This is one record of OGRA that mostly filling of cylinders is not carried out at LPG Storage & Filling Plants being the licensed premises.

This is another sad story of the LPG sector that OGRA issued 315+OGRA-licensed for LPG Marketing Companies and 5800 licensed for LPG Distributors. In the year 2011, there were 76 marketing companies registered with the OGRA. This massive growth came when the Aristotle of LNG Pakistan opened doors for massive companies which is also one of the abuses of adulteration in LPG.

When comparing Pakistan's annual LPG consumption, which exceeds two million tons, with Bharat Petroleum's robust marketing and distribution infrastructure, the disparity in operational efficiency and quality assurance becomes evident. Bharat Petroleum boasts an extensive and integrated network. This infrastructure ensures seamless delivery of high-quality LPG and cylinders directly to customers, embodying a service model unparalleled in the region.

A cornerstone of Bharat Petroleum's "Pure for Sure" initiative is the tamper-proof seal with QR codes on LPG cylinders. This innovation guarantees cylinder integrity and quality from the production plant to the customer's doorstep. This model provides a blueprint for maintaining international quality standards and operational excellence, addressing both customer satisfaction and safety concerns.

For Pakistan, adopting a model akin to Bharat Petroleum's could revolutionize its LPG sector, ensuring the delivery of safe, high-quality, and tamper-proof products directly to end-users. This system, centered on stringent quality control, innovative mechanisms like tamper-proof seals with QR codes, and operational transparency, could significantly elevate the standards of the LPG industry. However, substantial barriers hinder such progress.

In Pakistan, LPG marketing companies wield disproportionate influence, permeating regulatory and financial systems and exerting control over the appointments of key officials in entities like OGRA, HDIP, and the Ministry of Petroleum. This entrenched influence suppresses the possibility of adopting forward-thinking models like Bharat Petroleum's. As a result, the OGRA compromised management is outdated, perpetuating practices that fail to address substandard product quality and rampant adulteration. These issues, left unchecked, continue to degrade Pakistan's environment and public health, tarnishing the nation referred to as the "Land of the Pure."

Implementing a model inspired by Bharat Petroleum requires an unwavering commitment to transparency and accountability. These steps are not only necessary to elevate Pakistan's LPG sector but also critical to mitigating the environmental and health risks posed by low-quality and adulterated LPG distribution.

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Given the entrenched corruption and institutional stagnation within OGRA, HDIP, and the Ministry of Petroleum, meaningful reforms may only be possible through external intervention. Based on extensive firsthand experience, it is evident that these institutions resisting digitization or the adoption of AI, as their leadership has been strategically positioned to obstruct any changes that could ensure the purity of LPG.

A viable solution could involve temporarily transferring their management to an international consortium consisting of the UN, IMF, and World Bank for ten years. This consortium would focus on institutional restructuring, the implementation of global best practices, and the development of a transparent, efficient, and sustainable energy sector. The ultimate goal would be to ensure that LPG is no longer a contributor to smog, thereby fostering an environment that aligns with the purity that the "Land of the Pure" aspires to uphold.

## **Adulteration in Petrol, Diesel and other Petroleum Products**

The transport sector is a main contributor to the release of toxic pollutants, including carbon monoxide (CO), nitrogen oxides (NO<sub>x</sub>), sulfur dioxide (SO<sub>2</sub>), particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>), and volatile organic compounds (VOCs) such as benzene and toluene, both recognized as potent carcinogens. These emissions pose severe risks to human health while acting as precursors to ground-level ozone (O<sub>3</sub>) formation and the amplification of particulate matter concentrations. Vehicular emissions of NO<sub>x</sub>, SO<sub>x</sub>, and CO undergo atmospheric transformations into secondary pollutants, collectively contributing to the photochemical haze commonly referred to as Los Angeles smog or, more broadly, as smog.

In the 'Journal of Petroleum and Gas Engineering' (Vol. 1(2), pp. 37–40, June 2010), a study was conducted to evaluate engine-out emissions from a four-stroke, four-cylinder, water-cooled spark ignition (SI) engine using kerosene-gasoline blends with kerosene concentrations ranging from 0% to 50% by volume in increments of 10%. Exhaust emissions were analyzed using a Pocket Gas™ portable gas analyzer. The experimental findings revealed that engine-out emissions increased proportionally with the kerosene concentration in the fuel blend. Specifically, carbon monoxide (CO) emissions rose by 21.7–53%, unburnt hydrocarbon (HC) emissions increased by 23.4–57.1%, and particulate matter (PM) emissions saw a rise of 2.4–8.2%. Furthermore, the specific fuel consumption (SFC) escalated across all load conditions, with increases

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ranging from 34–36%. The study highlighted the urgent need for stringent measures to curb fuel adulteration. These include robust monitoring mechanisms and the imposition of severe penalties for the sale of adulterated fuels to mitigate their environmental repercussions.

Fuel adulteration is a major contributor to air pollution in South Asia, particularly in urban areas. According to the World Bank briefing note on South Asia Urban Air Quality Management, fuel adulteration significantly increases harmful emissions from vehicles, including:

- Hydrocarbons (HC): contributing to ground-level ozone formation and respiratory issues
- Carbon Monoxide (CO): a toxic gas that can cause headaches, dizziness, and nausea
- Oxides of Nitrogen (NOx): leading to respiratory problems and nitrogen dioxide formation
- Particulate Matter (PM): causing respiratory issues, lung damage, and other health problems <sup>1</sup>

These pollutants not only harm human health but also have devastating environmental impacts. The briefing note emphasizes the urgent need for effective air quality management strategies to mitigate these effects.

The Government of Punjab was tasked with addressing the pervasive issue of fuel adulteration in collaboration with OGRA by instituting and enforcing a robust program designed to curb and ultimately eliminate this malpractice. An initial deadline for implementing this initiative was set for December 2018. However, six years later, no substantive progress or updates on this critical matter have been reported.

The Smog Commission's report, dated May 28, 2018, established by the Lahore High Court, highlighted the historical context of air quality challenges in Punjab. Notably, the Lahore High Court had previously appointed the Lahore Clean Air Commission in 2003. This commission proposed multiple recommendations, including measures to improve 4-stroke rickshaw engines, enhance public transportation, and adopt stricter fuel and emission standards aligned with Euro II, III, and IV. These recommendations

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were endorsed by the court in its judgment *Mansoor Ali Shah vs. Government of Punjab\** (PLD 2007 Lah. 403) and remain pertinent in the context of the Smog Commission's findings.

The Smog Policy Committee was mandated to identify and propose actionable elements for a comprehensive Smog Policy for the Government of Punjab, incorporating insights from root cause analyses and international best practices. Yet, as I have previously highlighted, many pragmatic and implementable recommendations have been overlooked, undermining the commission's efficacy and leaving critical issues unaddressed.

Adulteration in fuel increases emissions of harmful pollutants from vehicles, worsening urban air pollution. Financial incentives and financial gains overnight are the primary cause of fuel adulteration.

#### Mixing of Naphtha in Petrol

The Cabinet Division's report uncovered the pervasive use of Naphtha, a by-product of the refining process, as an illegal substitute for motor spirit (MS) in Pakistan. While the standard imported MS in the country possesses a Research Octane Number (RON) of 92, Naphtha, with a considerably lower RON of 72, is illicitly blended with RON 92 MS to produce a substandard mixture with an average RON of 82. This blend mimics the regular MS formerly available in the market. Despite explicit prohibitions on the sale of Naphtha within Pakistan—mandating its export—these blending practices persist with alleged collusion of senior officials within OGRA and the Ministry of Petroleum.

Production data from the Ministry of Energy and the Oil Companies Advisory Council (OCAC) for the fiscal year 2019-20 revealed an alarming discrepancy of approximately 150,000 metric tons of Naphtha, highlighting potential malpractices. While the commission recommended an in-depth investigation into these irregularities, including production statistics and export documentation, the inquiry was abandoned,

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exposing serious regulatory oversight and accountability lapses. OGRA officials never tried plug this business

### Illegal oil retail outlets across Pakistan

Further compounding the problem, unofficial data suggests the existence of over 1,500 illegal oil retail outlets across Pakistan. While OGRA occasionally initiates superficial crackdowns, these unauthorized outlets operate outside the oversight of regulatory bodies, Oil Marketing Companies (OMCs), or district administrations. They rely on smuggling, black-market purchases, or illicit supplies from hoarders and unscrupulous OMCs. These outlets are notorious for adulterating hydrocarbon chemicals such as Light Aliphatic Hydrocarbon Solvent with motor spirit (MS), and kerosene with high-speed diesel (HSD), further degrading fuel quality.

Despite the gravity of the issue, OGRA, the Ministry of Energy and Petroleum Development (MoEPD), OMCs, the Department of Explosives, and district administrations have failed to undertake a comprehensive review of these illegal operations. The unchecked proliferation of such outlets exacerbates vehicular emissions, significantly contributing to deteriorating air quality and environmental degradation.

- It is common for many Oil Marketing Companies to import and store various chemicals in bulk, including VAM, Mixed Xylene, and N-hexane. Additionally, substantial quantities of these chemicals were identified in the import records at the ports. These substances are typically utilized as additives that can be incorporated into petroleum products. Primarily functioning as solvents, the inclusion of such solvents is a prevalent method of fuel adulteration, largely due to the significant disparity in taxation between petroleum products and solvents. The introduction of illicit compounds into fuels can lead to detrimental and hazardous consequences that have serious environmental hazards mixing with petrol and diesel risks the release of vapors and toxic Hydrocarbons (HC),

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**Carbon Monoxide (CO) Oxides of Nitrogen (NOx), and Particulate Matter (PM): causing respiratory issues, lung damage, and other health problems.**

The presence of these chemicals at the port raises concerns that fuel adulteration may not be limited to petrol pump operators and OMCs, but could also involve petrochemical importers. Some companies has dual involvement in both petroleum products and petrochemicals that can facilitate fuel adulteration is indeed alarming and warrants further investigation.

### **Profile: Arshad H. Abbasi - Climate Change Expert**

I may not be a professional climate change expert, but my lifelong passion for a clean and sustainable environment stems from my roots. Growing up in a picturesque village nestled at the base of the 7,600-foot-high Patriata Mountain (New Murree), I was surrounded by the serene beauty of nature. My home, perched at the edge of a dense blue-pine forest, instilled in me an enduring connection to the environment. To this day, the most captivating scent I can recall is the crisp, invigorating fragrance of blue-pine trees blanketed in snow—a memory that has profoundly shaped my commitment to environmental preservation.

As a professional engineer with extensive experience in both the water and energy sectors, I am driven by tangible and evidence-based results. My passion for nature stems from my time spent amidst the conifer forests, glaciers, and mountain streams—my favorite settings for relaxation and inspiration. This deep connection to nature motivated me to take a firm stand when the Government of Punjab announced the New Murree Project, which involved clearing over 40,000 kanals of ancient, dense conifer forests atop the 7,600-foot-high Patriata Mountain (New Murree).

I launched a fact-based scientific campaign, which included publishing research papers and leading a widespread advocacy initiative entirely on my own. As a result, I am proud to have been the sole practicing engineer and climate advocate in Pakistan to successfully halt the environmentally destructive New Murree Project—a feat that remains a singular success story in the country's environmental history. This achievement received high praise from Mr. Achim Steiner, Deputy Secretary-General of the United Nations and Administrator of the UNDP.

Another notable contribution to climate change advocacy is my work on the melting of the 2<sup>nd</sup> longest glacier on the earth Siachen Glacier, which is significantly impacted by the presence of the Indian military. My findings, supported by scientists and climate experts, put pressure on the Indian government to demilitarize the glacier. Unfortunately, the Government of Pakistan did not support this initiative, despite glaciers being critical indicators of climate change.

Glaciers are widely regarded as critical indicators of climate change due to their sensitivity to variations in temperature and precipitation. Their size and rate of retreat serve as clear evidence of a warming climate. My efforts to address the melting of the Siachen Glacier and advocate for the preservation of Himalayan glaciers have garnered global recognition, including acknowledgment

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from the late Dr. Rajendra Kumar Pachauri, former chairman of the Intergovernmental Panel on Climate Change (IPCC) from 2002 to 2015. During his tenure, the IPCC was honored with the Nobel Peace Prize in 2007. I am deeply grateful for the opportunity to gain invaluable insights and techniques on environmental preservation through my interactions with Dr. Pachauri. Notably, my research on the Siachen Glacier has been incorporated into the curriculum of universities offering climate change programs, further solidifying its impact on the academic and scientific community. Please check this link to verify this statement <http://surl.li/nwjyq>

## My work on Climate Change and the Energy Sector

My research paper, titled "*Model for Sustainable Procurement to Prevent Adulteration in Imported Fuel Oil*," based on extensive hands-on experience, has been published on Research Gate and Academia.edu as a reference. Additionally, my op-ed on oil impurities and the energy crisis was featured in *Daily Dawn* on December 11, 2011, while another op-ed on the issue of smog in Pakistan was published on January 5, 2014, in the same esteemed newspaper.

<https://www.dawn.com/news/770415/oil-impurities-amp-the-energy-crisis>

<https://www.dawn.com/news/1078453>

One of the most arduous campaigns I have undertaken was my resolute opposition to the commissioning of low-efficiency coal power plants in Pakistan. This crusade against the Government of Pakistan (GOP) highlighted the long-term environmental and economic repercussions of such short-sighted energy policies.

Coal-Fired Power Generation in Pakistan Technology, Efficiency and Pollution by Engineer Arshad H Abbasi

<https://crss.pk/coal-fired-power-generation-in-pakistan-technology-efficiency-and-pollution/>

A policy brief published in JSTOR, a reputable academic platform (<https://www.jstor.org/stable/resrep00591>)

Recognized by CTCN, the implementation arm of the UNFCCC- UN <https://www.ctcn.org/resources/coal-fired-power-generation-pakistan-policy-paper>

Added to Princeton University's database, a top-ranked global institution (<https://dataspace.princeton.edu/handle/88435/dsp012514nn86g>)

It deeply pains me to see my predictions come true regarding the performance metrics of CPEC coal-fired power plants, particularly concerning capacity payments. To provide clarity, the global power sector generally follows a two-part tariff structure: an Energy Purchase Price (EPP) and a Capacity Purchase Price (CPP). Official data reveals that Chinese coal-fired power plants under CPEC have set global records for electricity tariffs, surpassing even Denmark's high electricity cost of USD 0.54 per unit in many cases. The accompanying table highlights how Pakistan's reliance on these plants has not only strained its economy, reducing it to a state of economic dependency but has also exacted a heavy environmental toll. This burden is now manifesting in deteriorating air quality and persistent smog, exacerbating the country's climate challenges.

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## Proposal on Net-Zero Initiatives

**msalman@ogra.org.pk** <msalman@ogra.org.pk>

1 January 2024 at 16:40

To: ahabasi@gmail.com

Cc: siqbal@ogra.org.pk, stariq@ogra.org.pk, saslam@ogra.org.pk, iakhtar@ogra.org.pk, Imtiaz Gul <imtgul@gmail.com>, "Engr. M.A. Jabbar" <engrmajabbar@gmail.com>, Imtiaz Gul-CRSS <imtiaz@crss.pk>, Musa Arshad <musa.arshad.pakistan@gmail.com>, Farrukh Saleem <farrukh15@hotmail.com>, riasat.changazi@gmail.com, ansar.abbasi@gmail.com

Dear Arshad Abbasi Sahab,

This refers to your various telephonic discussions with the concerned in OGRA, your emails wherein you shared the proposal and your meeting with the OGRA Authority on 15<sup>th</sup> December 2023.

The energy challenges, infrastructure limitations and supply-demand gaps being faced by Pakistan as highlighted in your working paper addressed to the Ministry of Energy is appreciated. This shows your dedication and commitment.

Your proposal to achieve Net-Zero obligations policy of the UN and suggestions for use of electric stoves for cooking, electric geysers, AC inverters for heating, rooftop solar system installation, disconnection of gas connections etc. are policy matters of the Government of Pakistan and mainly pertain to PPIB and MoE, therefore the same has been sent to the Ministry of Energy for their perusal and is attached as a ready reference.

The matter will be further processed in MoE. Initiatives which are practical and are for the larger interest of the nation are always supported by OGRA.

Yours truly,

**Muhammad Salman**

Deputy Executive Director (LNG)  
Oil & Gas Regulatory Authority (OGRA)  
Islamabad, Pakistan.  
E-mail: [msalman@ogra.org.pk](mailto:msalman@ogra.org.pk)

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Annexure A

## Unconditional Apology for Our Innovations Submission

1 message

Arshad H Abbasi <ahabasi@gmail.com>

16 October 2024 at 18:52

To: Zainulabideen <zainqzain@gmail.com>, chairman@ogra.org.pk, esuddle@ogra.org.pk

Cc: hidayat@ogra.org.pk, Musa Arshad <musa.arshad.pakistan@gmail.com>

Bcc: idrees.engineer@gmail.com, Khalid Mustafa <skm.khalid@gmail.com>

To

His Most Excellent Majesty, Masroor Khan, Chairman, OGRA

CC His Majesty Member Oil Mr. Zain-ul-Abideen Qureshi Member Oil-OGRA

Oil & Gas Regulatory Authority-HQ Mauve Area, Service Road South, Sector G-10/4, Islamabad

Subject- **Unconditional Apology for Our Innovations Submission**

With utmost sincerity and humility, we seek your forgiveness for pursuing our innovation without prior approval and stakeholder engagement, particularly with petrol station owners, OMCs, petroleum importers from Iran, LPG and LNG importers, suppliers, and distributors of all products.

**We acknowledge our real-time petrol and diesel quality and quantity system poses a significant threat to their business. Our work was based on the misguided assumption that OGRA prioritizes consumer and state interests.**

You and Member Oil embody the pinnacle of scholarly excellence, intellectual brilliance, scientific acumen, engineering prowess, innovative spirit, and technological mastery in the 21st century. Your profound wisdom and knowledge are truly inspiring, and we recognize the immense gap between our understanding and yours. It would take us an eternity to approach your level of expertise.

**Our intention was solely to ensure the quality and quantity of diesel and petrol for all vehicle types, addressing the devastating impact of air pollution, which claimed 135,000 lives in Pakistan in 2015. Our goal was not to harm the business interests of all players of LPG, Petrol, diesel, and LNG but to safeguard the well-being of the most vulnerable.**

We regret any harm caused to you and OGRA and extend our sincerest apologies. **Similarly, our second innovation aimed to reduce circular debt and capacity payments while achieving net-zero targets without compromising LNG and LPG importers' financial interests.**

We waive any claim to honorarium or compensation for our efforts. Our greatest mistake was not obtaining your prior approval. We dedicate our work to you, with no objections should you choose to claim ownership.

We assure you that, moving forward, **we will refrain from any innovations that might harm oil importers, petrol pump owners, LNG and LPG importers, or their business models, even if detrimental to the environment, air quality, consumers, or Pakistan's government.**

Your exemplary efforts in safeguarding oil and gas investors' interests have earned our sincerest appreciation. Your legacy will endure, ensuring a stable and transparent industry for generations, **after the year 2200 (22<sup>nd</sup> century) and beyond**

Thank you for considering our plea.



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