

HOW CAN THE PRIVATE SECTOR HELP IMPROVE AIR QUALITY IN PAKISTAN?

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Introduction

Air quality has significantly deteriorated in Pakistan over the last decade. According to the Air Quality Life Index¹ Pakistan ranked as the 4th most polluted country in the world in 2022. Over the past five years, some larger cities such as Lahore and Karachi have regularly ranked as some of the most polluted cities in the world. The average particulate pollution in the country is 44µg/m³ as opposed to the World Health Organisation (WHO) guideline value of 5 µg/m³. This impacts the life expectancy of Pakistan's citizens by losing 2.7 years of their life.²

Moreover, poor air quality results in a plethora of health, economic and social consequences such as: obesity, mental illness, cognitive dysfunction, lower labor supply and productivity, higher incidence of violent crime, and disruptive migration³. Hence, it is imperative that steps be taken to improve the quality of air in Pakistan.

A Cause of Concern for the Private Sector

Businesses may ask why improving air quality is their responsibility? Pakistan's industry does not emit more than 0.9% of the world's GHG emissions⁴, while the world has used the same fuel and industrial processes to build their economy that Pakistani businesses are now being asked to discontinue. Following are some of the reasons why Pakistan's private sector should contribute to reducing air pollution.



Public Health Responsibility

Exposure to PM2.5 increases the incidences of cancer and cardiovascular and respiratory diseases (Nasim and Sharif, 2020).

The industry must take responsibility for its contribution to the public health crisis that air pollution has caused.



Reduced Labor Productivity

By 2060, a global loss of 3.8 billion working days annually has been predicted (Ahrens and Burston, 2019).

Productivity losses due to increased sick days as a consequence of poor air quality.

Compromised performance due to mental illness and cognitive dysfunction.

Labour supply is adversely affected by a change in migration patterns, discouraging workers from moving to polluted cities like Lahore.



Reduced Consumer Footfall and Sales

It is estimated that if climate change actions are delayed, industry's GDP could decline by 7–8% by 2030, and by as much as 17% by 2050 (World Bank).

Poor air quality also impacts consumer behavior.

People choose to stay indoors on days where air quality is exceptionally low, which translates to lower sales and revenue.



Impact on Business Efficiency

Air pollution particularly during the smog season can impact delivery of goods as road and air transport is disrupted. This incurs higher business costs.

Physical assets are degraded and their efficiency is compromised; this increases the frequency at which businesses incur replacement costs (Clean Air Fund, 2021).



Rising Demand for Sustainably Sourced/Produced Goods

According to a Forbes survey, 88% of surveyors want brands that employ good environmental standards and practices (Ahrens and Burston, 2019).

Sustainable practices and meeting the highest environmental standards can attract international clients who are looking to make their entire value chain practices sustainable.

Opportunity for firms to engage in corporate social responsibility (CSR) and build goodwill with their environmentally conscious consumers.

Mitigative and Adaptive Role of the Private Sector

The fundamental point is that clean air can be good for business as they stand to lose a lot in terms of productivity and revenue due to air pollution⁵. It is in the private sector's own best interest to adopt mitigative practices to lower their own emissions and carbon footprint as highlighted in the previous section. The private sector can also capitalize on the opportunity to fulfill their corporate social responsibility (CSR) and improve their business reputation by greening their operations. It is pertinent to note that the greening of business processes cannot be achieved overnight, and the transition will look very different for varying levels and nature of businesses. Therefore, when devising a clean air agenda, it is important for businesses to take a methodological approach to setting achievable goals in view of their resource and capacity constraints. A schematic representation of the agenda setting⁶ process is given below.

¹ Pakistan - Air Quality Life Index, Energy Policy Institute at the University of Chicago. <https://aqli.epic.uchicago.edu/country-spotlight/pakistan/>

² Michael Greenstone and Qing (Claire) Fan, Pakistan's Air Pollution Challenge & Potential for Longer Lives, EPIC 2019. <https://aqli.epic.uchicago.edu/wp-content/uploads/2019/02/Pakistan-Report.pdf>

³ Sanval Nasim and Mahnoor Kashif, Punjab's Pollution Crisis: Information, Research and Policy Gaps, Pakistan Dialogues 2021. <https://mhrc.lums.edu.pk/punjab-pollution-crisis/>

⁴ Updated Nationally Determined Contributions 2021, Government of Pakistan. <https://unfccc.int/sites/default/files/NDC/2022-06/Pakistan%20Updated%20NDC%202021.pdf>

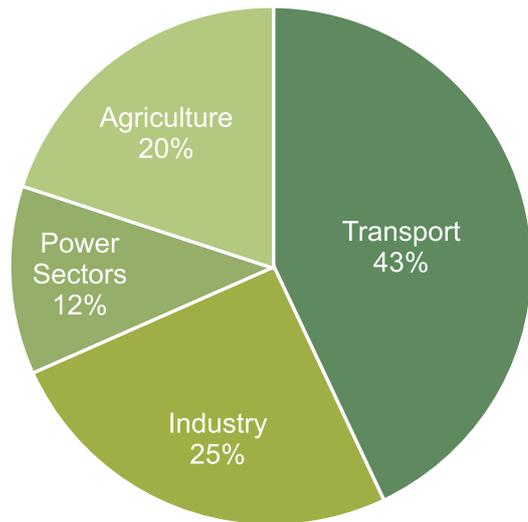
⁵ OECD. The Economic Consequences of Outdoor Air Pollution: Policy Highlights. 2016. <https://www.oecd.org/environment/indicators-modelling-outlooks/Policy-Highlights-Economic-consequences-of-outdoor-air-pollution-web.pdf>

⁶ Adapted from figure 5 of the report ORF report Finding Solutions to Air Pollution in India: The Role of Policy, Finance, and Communities. 2020. https://www.orfonline.org/wp-content/uploads/2020/09/ORF_SpecialReport_120_AirPollution_FinalForUpload.pdf

Figure 1: Schematic representation of process of developing a clean air agenda



Figure 2: Sector contribution to total airborne emissions in Punjab



Source: Food and Agriculture Organisation (FAO) (2018)⁷.

The contribution of various sectors to air pollution in Punjab can be seen in figure 2. It is imperative that swift and pertinent steps be taken to mitigate the adverse impacts of these sectors. Businesses can play a pivotal role in this effort through a number of actions by focusing on the following aspects.

Green Transport

Opting for EVs will cut long-run business operation costs.

It is believed that large-scale penetration of Electric Vehicles (EVs) will decrease dependence on fossil fuel for transportation. This has potential to lower the country's import bill and also reduce GHG emissions⁸. A study of 20 countries across Africa, Asia, the Caribbean, Oceania, Europe and South America found that more than half would benefit economically by adopting electric mobility⁹. McKinsey has estimated that the cost of owning all types of EVs will be at par with their Fossil Fuel Vehicle (FFV) counterparts by 2030¹⁰. The rise in petroleum prices is expected to expedite EV uptake in the country. EVs are more efficient than their FFV counterparts, approximately 75-84 percent of energy from fuel is lost in FFVs compared to around 31-35 percent in EVs¹¹. Estimates suggest that the cost per km for an EV is 2.8 Rs/Km as opposed to 7.8 Rs/km for FFVs¹².

- When purchasing vehicles for business use, it is worth investing in EVs. Although EVs require a higher initial investment than fossil fuel vehicles (FFVs), companies will save money in the long run. To ease the financial burden of this hefty investment, firms can transition gradually by replacing older vehicles in their fleets as they reach the end of their life¹³. Transitioning to EVs can help businesses reduce the total cost of ownership of fleets due to lower fuel and maintenance costs, maintenance of EVs is less costly due to fewer mechanical component parts prone to failure¹⁴. Companies like Uber, Walmart and Tesco have pledged to decarbonize their fleets within the next 10-20 years¹⁵.

⁷ FAO. Remote sensing for space-time mapping of smog in Punjab and identification of the underlying causes using geographic information system (R-SMOG). Islamabad 2020. <https://doi.org/10.4060/ca6989en>

⁸ NEPRA, Annual Report 2021-22. <https://nepra.org.pk/publications/Annual%20Reports/Annual%20Report%202021-22.pdf>

⁹ Cecilia Briceno-Garmendia, Foster Qiao, Wenxin, Vivien. The Economics of Electric Vehicles for Passenger Transportation. Washington, DC: World Bank. 2022. <https://openknowledge.worldbank.org/handle/10986/38265>

¹⁰ McKinsey, Global Energy Perspective 2019: Reference Case. 2019. [tinyurl.com/mr3e4cx4](https://www.tinyurl.com/mr3e4cx4)

¹¹ Justin Westbrook. Electric Vehicles Are Way, Way More Energy-Efficient Than Internal Combustion Vehicles. 2022.

<https://www.motortrend.com/news/evs-more-efficient-than-internal-combustion-engines/#:~:text=In%20total%2C%20approximately%2075%20to,original%20gasoline's%20energy%20is%20lost.&text=Compare%20that%20to%20only%2031,po tential%20recuperation%20from%20energy%20regeneration.>

¹² LUMS. Electric Vehicles in Pakistan: Policy Recommendations. USAID 2019. <https://web.lums.edu.pk/~eig/pdf/evReport.pdf>

¹³ Driving Sustainability in Transportation and Delivery: Everything You Need to Know About Green Transportation, OptimoRoute, 2022.

<https://optimoroute.com/green-transportation/>

¹⁴ Five Reasons to Transition Your Business to Electric Vehicles (EV). <https://www.centricbusinesssolutions.com/us/blogpost/five-reasons-transition-your-business-electric-vehicles-ev#:~:text=Reduce%20costs%20and%20improve%20productivity,organizations%20can%20see%20significant%20savings.>

¹⁵ Cecelia Keating. The catalytic potential of fleet electrification. 2022.

<https://climatechampions.unfccc.int/driving-the-green-recovery-the-catalytic-potential-of-fleet-electrification-pledges/>

- In the next few years this transition will be even more critical for the logistics and transport sector as EVs have great potential to reduce their operational costs; commercial vehicles of all sizes that transport passengers and cargo stand to gain the maximum benefit from better unit economics of EVs¹⁶.
- Charging infrastructure is expected to grow fairly rapidly to meet the requirements of the growing number of EVs. The government plans to set up five new charging stations at highways and motorways across the country¹⁷. A well-established charging network increases vehicle miles using electricity, relieves range anxiety and reduces inconvenience concerning charging process¹⁸.

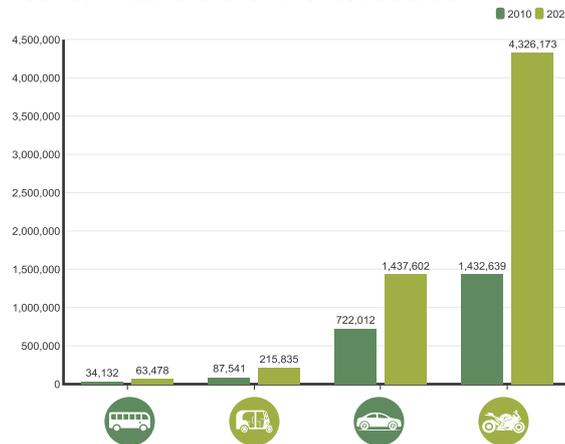
Investment in sustainable transport is a business opportunity.

EV global sales amounted to USD 6.6 billion in 2021. 10% of all global car sales were electric¹⁹. EV penetration remains low in Pakistan, with only about 2,000 fully electric cars and a few e-buses in Karachi and Punjab. The major roadblocks to EV adoption in Pakistan include high upfront costs, high battery replacement, range anxiety, insecurity of reliable electricity provision, lack of charging stations, no domestic industry, lack of spare parts and maintenance services²⁰.

The private sector should consider investing in setting up sustainable projects such as EV plants and transport services. This can also be done in partnership with the public sector for which firms should remain on the lookout for PPP opportunities. The MoU between K-Electric and Shell²¹ to set up charging stations is a prime example of PPP for EV facilitation. Setting up more of such initiatives and associated infrastructure is an opportunity to penetrate into an untapped market:

- **Set up EV charging stations:** Due to limited EV infrastructure there is a lot of range anxiety within consumers when considering making the switch to EV. Currently there are around a dozen fast charging stations in the country. There are plans to set up several more along motorways²². Despite this limited infrastructure, a large market is open for EV batteries and related storage needs. This presents a viable business opportunity for private sector players to set up EV charging stations. Another opportunity is to set up battery swapping station similar to the successful model adopted by India²³.

Figure 3: Increase in registered automobiles in Lahore over the last decade



Source: Climate and Environmental Crisis: A Ray of Hope Through Uptake of Electric Bikes²⁴

¹⁶ Pakistan: Electric Vehicles and Batteries Market Assessment. USAID 2021.

https://pdf.usaid.gov/pdf_docs/PA00XXDK.pdf

¹⁷ Tahir Niaz. Govt to set up 5 new EV charging stations at motorways. 2022. <https://www.nation.com.pk/14-Nov-2022/govt-to-set-up-5-new-ev-charging-stations-at-motorways>

¹⁸ Bálint Csonka and Csaba Csiszár. Determination of charging infrastructure location for electric vehicles. 2017. <https://doi.org/10.1016/j.trpro.2017.12.115>

¹⁹ Global EV Outlook 2022. International Energy Agency, 2022. <https://iea.blob.core.windows.net/assets/ad8fb04c-4f75-42fc-973a-6e54c8a4449a/GlobalElectricVehicleOutlook2022.pdf>

²⁰ Maham Rasheed, Taram Nayab and Syed Hasan. Climate and Environmental Crisis: A Ray of Hope Through Uptake of Electric Bikes. Pakistan Dialogues 2022. <https://mhrc.lums.edu.pk/climate-and-environmental-crisis-a-ray-of-hope-through-uptake-of-electric-bikes/>

²¹ Shell Recharge – Shell's Offering for Electric Vehicle Charging. Shell. <https://www.shell.com.pk/motorists/shell-recharge.html>

²² Jawwad Rizvi. 85 Locations identified for EV charging stations at motorways, 2022. <https://www.thenews.com.pk/print/922257-85-locations-identified-for-ev-charging-stations-at-motorways>

²³ Battery Swapping Policy. Government of India, 2022. https://www.niti.gov.in/sites/default/files/2022-04/20220420_Battery_Swapping_Policy_Draft.pdf

²⁴ Maham Rasheed, Taram Nayab and Syed Hasan. Climate and Environmental Crisis: A Ray of Hope Through Uptake of Electric Bikes. Pakistan Dialogues 2022.

- **Set up EV manufacturing Plants:** There is an opportunity for private firms to become pioneers in this emerging industry and become part of the EV global value chain. Moreover, The National Electric Vehicle Policy provides several incentives such as sales tax cuts, no customs duty on import of plant and machinery, minimal customs duty on the import of EV parts, and no registration charges for electric vehicles.²⁵ Despite issues in implementation have resulted in a stalled uptake of EVs²⁶ it is worthwhile for more firms to assess feasibility of delving in the EV industry. Firms can consider setting up plants to manufacture motorcycles as the demand for this two-wheeler is much higher than all other forms of transportation. Plans to scale up to producing electric cars can be included in the inception phase but executed when the firm has the capacity to scale up operations. Locally produced EVs will be more affordable and hence more accessible to a larger segment of the population. Local assembly lines will also ensure availability of spare parts and maintenance services.

Adopting green and sustainable practices helps build a reputation of an environmentally conscious business.

Businesses can earn more money and boost their bottom line by adopting sustainable practices. Reduced business costs, more innovative strategies, an improved reputation, and more new customers who value sustainability all work to increase the amount of money sustainable businesses earn²⁷. The most immediate and financially viable step that firms can take is to adopt better inhouse practices. This can be done by:

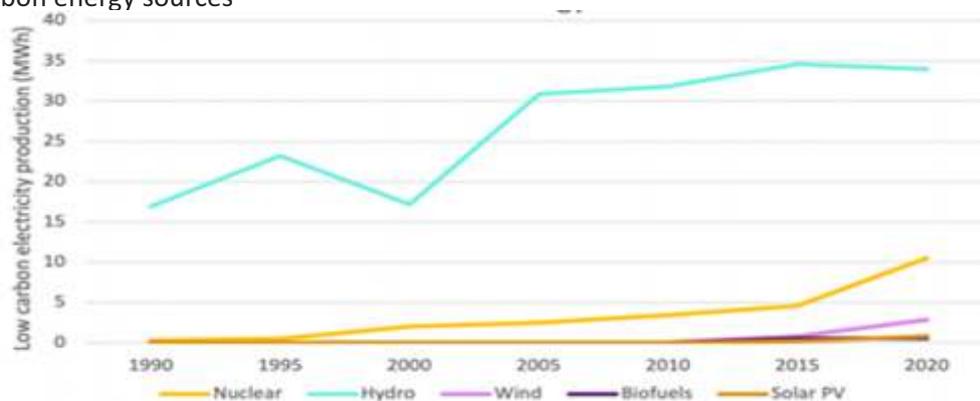
- Providing transportation services for employees. This will act as a strong incentive for employees and reduce absenteeism, improve employee productivity, it will allow firms to hire diversified talent, as employees, especially women, who may not have access to safe and reliable transportation will be able to come into the office.
- Businesses should encourage employees to carpool.
- Regularly maintain vehicles to improve efficiency (properly inflate tyres, replace old worn-out tires timely, properly dispose of tyres)

Renewable Energy

Investing in smaller solar setups can save energy costs.

Switch to solar power: One way the industry can aid in improving air quality is through the use of renewable energy. Currently, Pakistan's grid is fueled by mostly fossil fuels (63%), partially hydroelectric power (25%) and less than 6% renewable energy. While Pakistan has a lot of potential in developing renewable energy, particularly solar due to conducive climate²⁸, there has been limited progress due to poor implementation of regulations, difficulty in pricing and limited government capacity. Overall, despite growth in installed capacity (GWh) by 260%, solar remains a small portion of the renewable energy mix (Figure 4)²⁹.

Figure 4: Low-carbon energy sources



Source: International Energy Agency³⁰

²⁵ National Electric Vehical Policy. Ministry of Climate Change. Government of Pakistan. 2019.

<https://policy.asiapacificenergy.org/sites/default/files/National%20Electric%20Vehicle%20Policy%20%282019%29.pdf>

²⁶ Muhammad Umer, Zain Rafique, and Athar Rashid, Challenges in Implementing the National Electric Vehicles Policy of Pakistan. 2022.

<http://dx.doi.org/10.2139/ssrn.4291168>

²⁷ Maryville University. The Importance of Environmental Awareness When Running a Business. <https://online.maryville.edu/blog/importance-of-environmental-awareness-when-running-a-business/>

²⁸ Adnan, et al. Solar energy potential in Pakistan. Journal of renewable and sustainable energy. (2012). <https://aip.scitation.org/doi/10.1063/1.4712051>

²⁹ Allegra Saggese. How reforming energy systems can tackle climate risks: Evidence from Pakistan, 2023.

<https://www.theigc.org/blogs/how-reforming-energy-systems-can-tackle-climate-risks-evidence-pakistan>

³⁰ Pakistan. International Energy Agency, 2021. [IEA \(2021\)](https://www.iea.org/countries/pakistan)

For Pakistan's industry the first step to going green is using clean energy to power their operations, for which solar is a feasible option. There are several reasons why a business would choose to do that:

- Firstly, cost – as technology improves, solar is becoming more and more affordable.³¹
- Secondly, with the government's commitment to climate change visible through its “Alternative Renewable Energy (ARE) Policy 2019”, “National Electricity Policy 2021” and its international commitments, there are a likelihood of incentives that will help the industry reduce its energy cost if it goes green.

However, under the current macroeconomic situation, there are challenges in procuring imports and in the actual implementation of government incentives and policies. Hence, firms can choose the route that is most viable for them.

- One option is to install **solar energy on rooftops and excess land** and not only power the company's own premises but also use net metering and give back to the grid. This can substantially reduce the electricity bill as the producer is paid back for the excess electricity produced. Setting up solar PV at a smaller scale like on rooftops has reduced in cost 10 times in the last decade, as competition has increased³². However, power is produced for only a few hours of the day, hence there is still a need to rely on other sources of power or install storage batteries which are expensive.
- The second option and the more challenging one is to **establish a utility scale solar PV setup** which can be used to power one owns setup and also allows selling to other entities. This brings its own obstacles, which includes whether transmission lines can carry the load produced from such setups. Generally, our grids are unable to absorb over 10 percent share of solar (although it varies from grid to grid). However, if a small plant is set up next to a feeder and produces 1-2MV, the grid will be able to absorb that. More importantly due to the current long term thermal contracts that the government has entered with IPPs, DISCOs are reluctant to buy power from solar plants, while NEPRA is reluctant to provide too many licenses. Hence a more optimal option is to keep solar plants at a small scale where investment is feasible and the return can be actualized.³³
- Another possibility that can be considered is **installing Concentrating Solar Power (CSP) plants** as an alternative to photovoltaic technology due to their high-capacity factor. By complementing it with low-cost thermal energy storage, CSP can provide renewable power at most times of the day. This solves the challenge of generating electricity even when the sun is not shining.³⁴

For smaller enterprises, **community solar setups are an innovative route**. Small enterprises can buy or rent from a larger plant which for example is setup near an industrial zone. Due to economies of scale, the cost per KW is lower (can be 15-20 percent lower). In return for their purchased equity, the industry could get cheap electricity (as they would be paying mostly maintenance and distribution costs)³⁵. This setup is becoming popular in the US as it is said to reach consumers who have moderate means.³⁶

Industries with agriculture linkages can take advantage of biomass or biogas as an energy source.

Invest In biogas/biomass: Another green alternative to solar is using biomass or biogas which may not be able to provide power throughout the year but can be used in a hybrid model, paired with other sources when unavailable. One such example are Bagasse plants that have been successfully powering sugar mills in Pakistan. Similarly, other agriculture residue can be explored to see if it can be used to generate power e.g. cotton stock, rice husk and wheat straw which have the potential of producing more than 25000GWh/year.³⁷

For the meat industry, biogas is an option. Cattle colonies large enough to produce substantial manure can be used as a source to power biogas plants which can provide enough power to meet the industry's own needs. However, in the absence of a formal policy for biomass/biogas, it becomes difficult to determine energy prices and obtain permits³⁸ which is one reason it has not been fully utilized.

³¹ Sachetto, et al. Priorities for renewable energy investment in fragile states. (2020)

<https://www.theigc.org/sites/default/files/2020/11/Sachetto-Stern-Taylor-2020-Policy-Brief.pdf>

³² Ilhan Oztruk. Working Paper - Energy Dependency and Security: The Role of Efficiency and Renewable Energy Sources. International Growth Centre, 2014.

<https://www.theigc.org/sites/default/files/2014/04/Ozturk-2014-Working-Paper.pdf>

³³ Ali Khizar. Solar Power – Trend with care. Business Recorder, 2022. <https://www.brecorder.com/news/40195669>

³⁴ Farrukh Mian. How Pakistan should meet clean energy challenges. DAWN, 2019. <https://www.dawn.com/news/1460321>

³⁵ Ahmer Syed. The Power of Community Solar. DAWN, 2023. <https://www.dawn.com/news/1737911/the-power-of-community-solar>

³⁶ Hausman. How community solar can benefit low and moderate income customers. (2022). <https://www.wri.org/insights/community-solar-low-income-customers>

³⁷ Wajahat Tareen, et al. Present Status and Potential of Biomass Energy in Pakistan Based on Existing and Future Renewable Resources. Sustainability, 2019. [10.3390/su12010249](https://doi.org/10.3390/su12010249).

³⁸ Ibid

In such cases leveraging PPPs can prove to be beneficial for both the public and private sector in negotiating and overcoming these challenges. Moreover, there is a need for more research and development to improve conversion technology.

Industrial Emissions

Reducing industrial emissions allows efficiency gains as well as potential entry into the global value chain.

Industrial emissions contribute substantially to the air pollution in Pakistan. A number of initiatives can be taken by private sector players to reduce these emissions and better manage industrial waste:

- Firms that opt to burn their waste in order to produce energy for their other operations, should do so with caution, as burning heavy metals and dioxins can release poisonous gases on combustion. Additionally, all ash resulting from combustion must be properly disposed of.³⁹
- Several industries, including brick kilns, steel re-rolling, steel recycling, and plastic molding, also contribute substantially to urban air pollution through use of outdated machinery and poor quality or waste fuels. Firms should invest in new, green technologies⁴⁰ along with choosing better
- quality fuel with a lower sulfur content to power their generators and machinery. This increases the efficiency of processes, prolongs the life of physical assets, and improves productivity of business assets.⁴¹ Big companies like Adobe, Sony, HP, Google, Philips lighting and Apple have all adopted technologies which reduce their carbon footprint.⁴²
- Adherence to global emission standard will also increase the export competitiveness of products as well as allow entry into global value chains particularly those looking to make their value chains green.⁴³ The Pakistani textile sector has realized this and is striving to make their processes sustainable in order to make them globally competitive.⁴⁴

Research and Development

Businesses can be forward looking and invest in green technology and clean energy early to make meaningful gains.

Global trends indicate that green technology and clean energy is the way forward.

- This means thinking long term and investing in R&D as well as collaborating across sectors to explore this market and develop innovative solutions to the air quality crisis. One example is IKEA which used rice straw, otherwise burnt, as a raw material for its new furniture line. Hence, a byproduct was re-purposed and turned into a profitable venture.⁴⁵ Another example is of Exxon Mobil which is collaborating with think tanks and IT universities in India to come up with innovative low emission technology solutions.⁴⁶
- R&D should also encompass data. The private sector can partner with the government to help fill the data gap by not only designing low-cost sensor technologies to measure air quality data but to also help analyze it. Firms can start by monitoring their own emissions and sharing this data to help the government use it in combating the air pollution crisis.

³⁹ Solid Waste Management Sector in Pakistan: A Reform Road Map for Policy Makers. Asian Development Bank, 2022. <https://dx.doi.org/10.22617/TCS220086-2>

⁴⁰ Ning Ma, et al. Can Green Technological Innovation Reduce Hazardous Air Pollutants? —An Empirical Test Based on 283 Cities in China. National Library of Medicine, 2022. <https://doi.org/10.3390/2Fijerph19031611>

⁴¹ Air Pollution and its Impact on Business: The Silent Pandemic. Clean Air Fund, 2021. https://www.cleanairfund.org/wp-content/uploads/01042021_Business-Cost-of-Air-Pollution_Long-Form-Report.pdf

⁴² Amplifyre. Top 8 Green Technology Companies in 2023. 2023. <https://www.amplifyre.com/articles/companies-that-are-leading-way-in-green-technology>

⁴³ The Punjab Clean Air Action Plan. Environmental Protection Department. Government of Punjab.

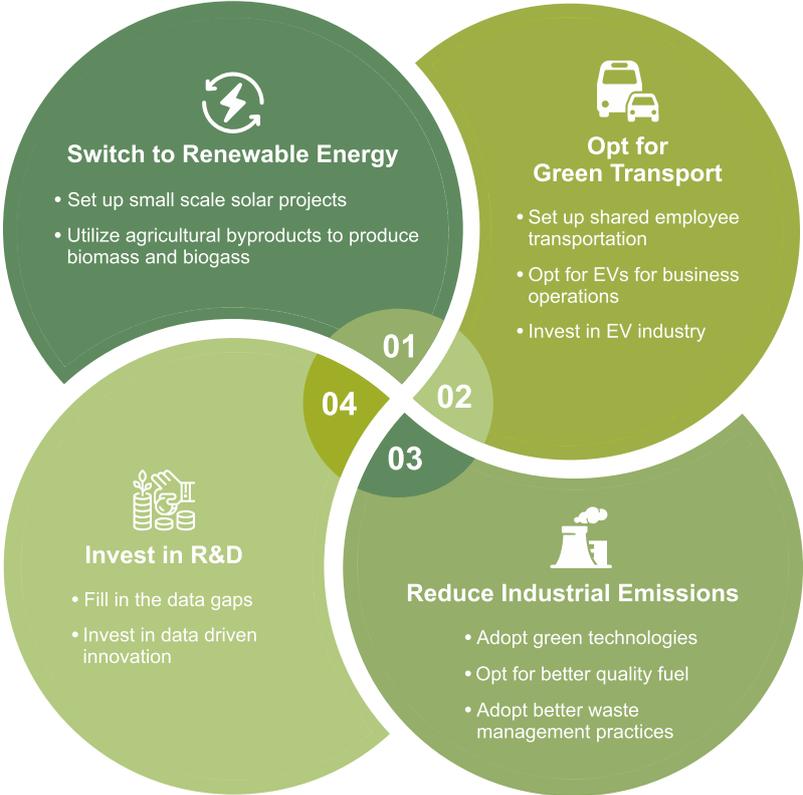
https://epd.punjab.gov.pk/system/files/Annex%20D2%20Punjab%20Clean%20Air%20Action%20Plan_0.pdf

⁴⁴ APTMA. Sustainable Business Practices in Textile Sector of Pakistan. 2022. <https://aptma.org.pk/sustainable-business-practices-in-textile-sector-of-pakistan/>

⁴⁵ Aparna Roy, Tanushree Chandra and Aditi Ratho, "Finding Solutions to Air Pollution in India: The Role of Policy, Finance, and Communities," *ORF Special Report No. 120*, Observer Research Foundation 2021. <https://www.orfonline.org/research/finding-solutions-to-air-pollution-in-india-the-role-of-policy-finance-and-communities-74311/>

⁴⁶ India's Private Sector Joins the Battle Against Air Pollution. BBC. <https://www.bbc.com/storyworks/future/powering-innovation-india/can-indias-private-sector-fight-an-environmental-crisis>

What can the private sector do?



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