GLens – Air Quality Analytics Software

GLens
For a Greener Tomorrow

Knowledge Lens
A ROCKWELL AUTOMATION COMPANY

G Lens is a real time data acquisition, monitoring, reporting and analytics software for environmental data that is compliant with EN14181 and MCERTS requirements. Our Air Quality Analytics software enables pollution source identification, air quality management, regulation, and forecasting, positively impacting infrastructure, planning and human behaviors.

Benefits

- Real-time data acquisition and analytics
- Intuitive reports as per industry norms
- Active citizen involvement
- Environmental regulation compliance

National Air Quality Index- An Overview

Air Quality Index (AQI) is an overall scheme, based on Indian Air Quality standards, that transforms individual air pollutant (e.g. SO2, CO, PM10) levels into a single number, thus making air pollution-related information accessible to all.

AQI	Remark	Color Code	Possible Health Impacts
0-50	Good		Minimal impact
51-100	Satisfactory		Minor breathing discomfort to sensitive people
101-200	Moderate		Breathing discomfort to the people with lungs, asthma and heart diseases
201-300	Poor		Breathing discomfort to most people on prolonged exposure
301-400	Very Poor		Respiratory illness on prolonged exposure
401-500	Severe		Affects healthy people and seriously impacts those with existing diseases

AQI values with respective health impact levels Source: CPCB, India

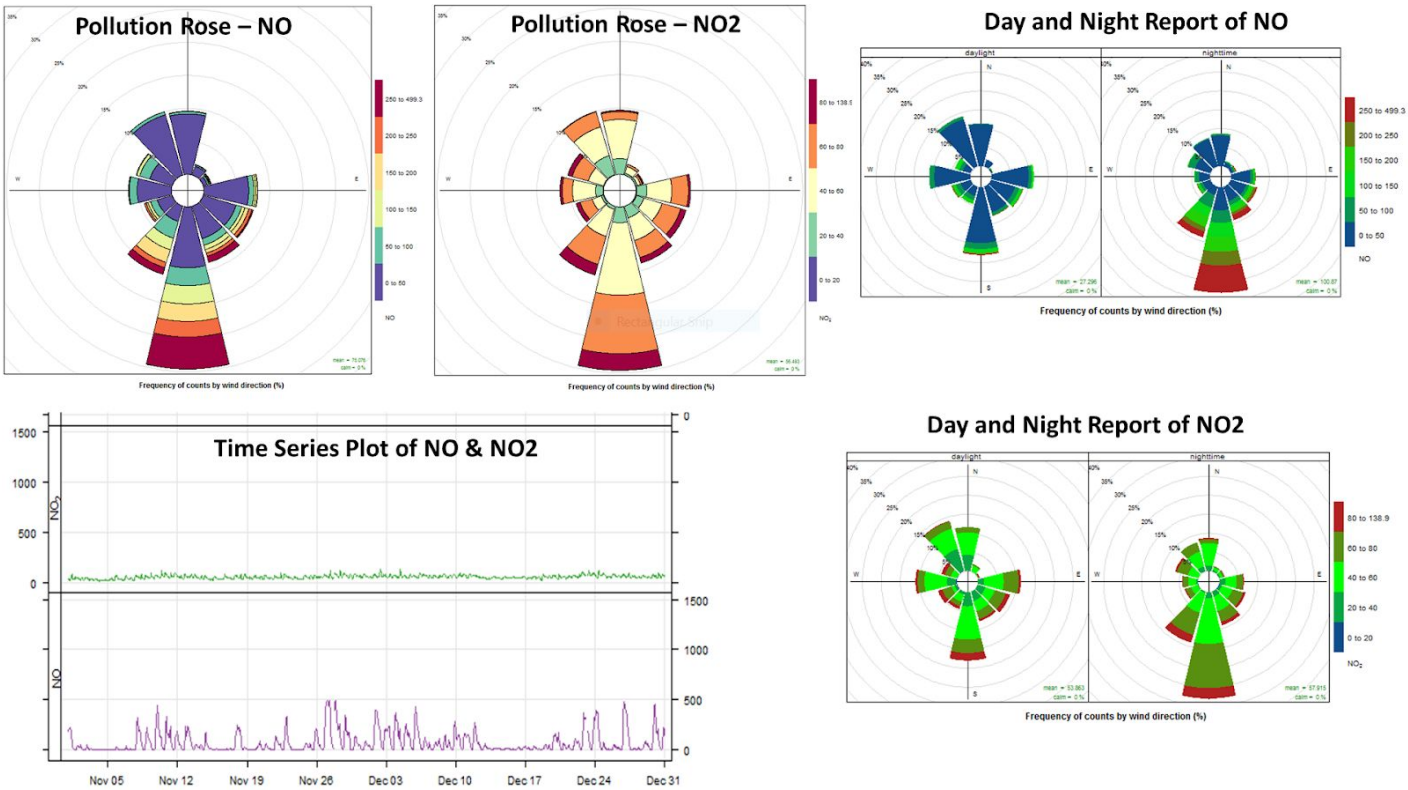
Efficient AQI Analysis prompts local authorities to take quick actions and guides policy makers to take informed decisions. Above all, it encourages citizens to actively participate in air quality management.

Air Quality Analytics with Glens - Key Capabilities

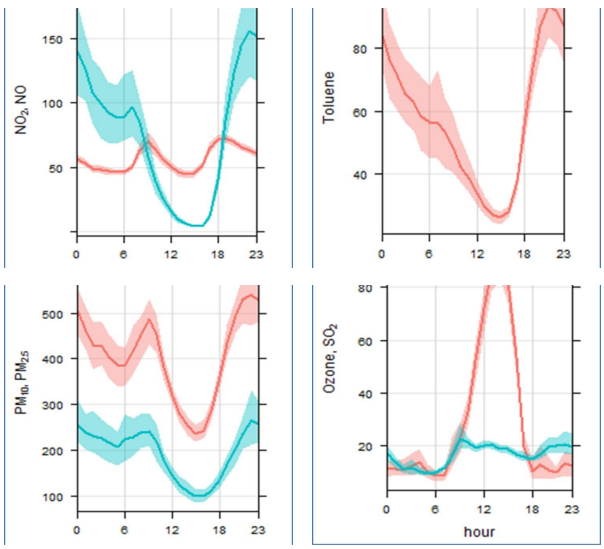
- Identification of pollution sources
- Air Quality Public Complaint Management
- Integration with Satellite Data
- Air Quality Modeling
- Air Quality Forecasting

Case Study- Identify Pollution Sources in Real-time

We evaluated the continuous ambient air quality in Vivek Vihar, Delhi to determine the air quality level with respect to a set of common pollutants- PM10, PM2.5, NO2, NO, Toluene, Ozone and SO2.



Air Quality Analysis of NO and NO2 in ambient air using Pollution Rose and Time Series analyses. Similar analysis was carried out for PM10, PM2.5, Toluene, Ozone and SO2.



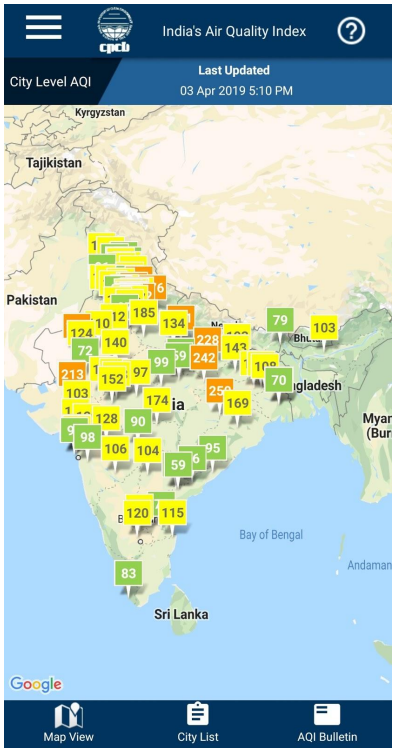
Time Variation Report of various pollutants- PM10 and PM2.5, NO2 and NO, Toluene, Ozone and SO2.

Through the trend analysis, it was concluded that:

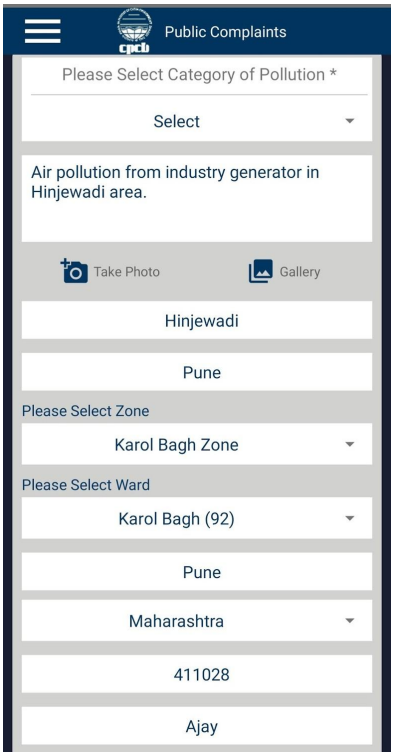
- The Jhilmil Industrial Area contribution to the CAAQM station was less.
- The contribution of pollutants due to vehicular emission was minimum.
- All pollutants (PM10, PM2.5, NO, CO and SO2) were on the increasing trend from 4pm, reaching their peak at 12.00am, and persisting up to 6am.
- It became clear that the pollutants were from combustion sources.
- Thus, the maximum pollutant emission was from nearby combustion sources or localized combustion processes, and not from vehicular or industrial sources.

Air Quality Public Complaint Management with the Sameer App

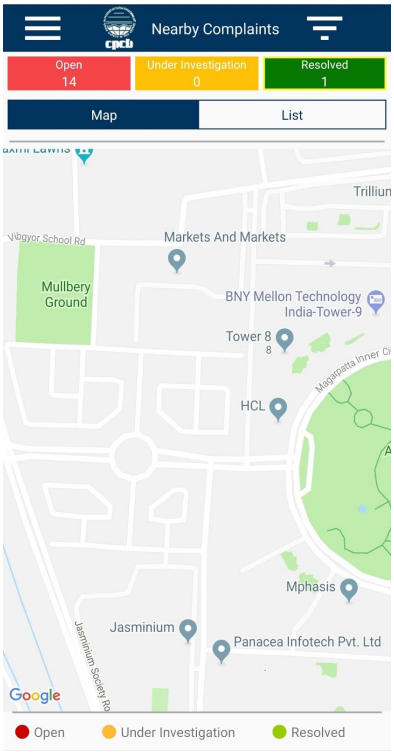
The Sameer app is a green initiative, that we developed in concert with the Central Pollution Control Board (CPCB). It is a real-time AQI monitoring app, which provides you with hourly updates of the National AQI published by CPCB.



City-wise AQI listing

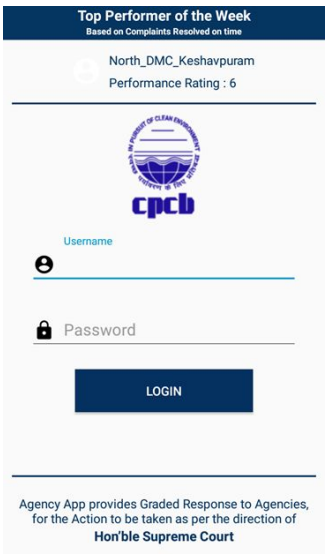


Simple complaint lodging interface.

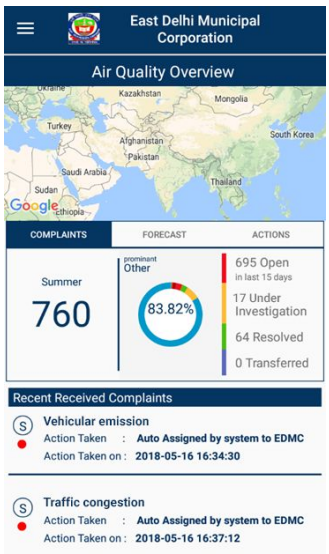


View complaints that are Open, Resolved and Under Investigation in your locality.

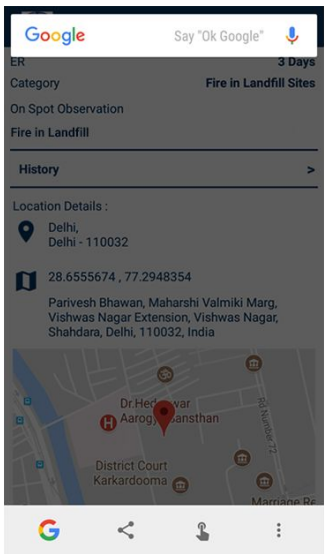
How it works ?



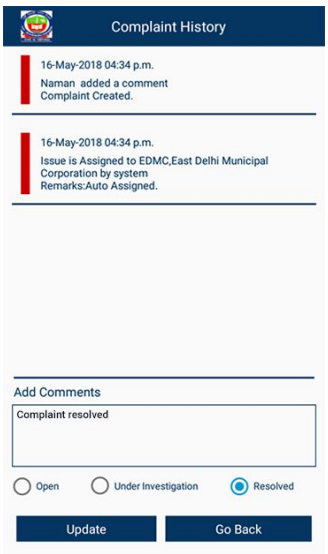
Organization logs on to the system through Sameer



Inspects all complaints received , and views a particular complaint.



Views complaint location on map.



Authorized official then updates complaint status after resolving it.

Key features

- Map view and City view of AQI
- Viewing Nearby Complaints
- Complaint Lodging and Tracking
- AQI Bulletin on air pollution levels across the country

Call out regulation violators

- Simple, hassle-free complaint filing
- Track the status of open complaints
- View other complaints in your locality

The information provided via Sameer is credible and accurate, and enables one to stay updated on all air quality-related information. It allows one to actively participate in the well-being of the environment, and make informed choices based on air quality levels in one's locality.

Organization Dashboard view.

Air Quality Index Forecasting

Central Control Room for Air Quality Management - Delhi NCR

ADMIN

Forecast of Air Quailty index

Updated on : 08-04-2019 16:00:00

Show 10 entries

Search:

SL NO.	Station Name	PM 2.5 AQI		
		Forecast on 09-04-2019	Forecast on 10-04-2019	Forecast on 11-04-2019
1	North Campus, DU, Delhi - IMD	275	254	233
2	IGI Airport (T3), Delhi - IMD	223	205	187
3	Pusa, Delhi - IMD	206	189	172
4	Aya Nagar, Delhi - IMD	194	177	161
5	Lodhi Road, Delhi - IMD	182	166	150
6	Sector - 62, Noida - IMD	193	177	161
7	CRRI Mathura Road, Delhi - IMD	216	199	181
8	Shadipur, Delhi - CPCB	293	277	260
9	ITO, Delhi - CPCB	196	185	174
10	DTU, Delhi - CPCB	196	185	174

Showing 1 to 10 of 20 entries

Previous 1 2 Next

View AQI forecasts for the following week, on your GLens dashboard. These forecasts take into account actual air quality data and weather forecast information, and is of absolute accuracy.

Case Study- Measurement of Ambient Volatile Organic Compounds

We worked with Hindustan Petroleum Corporation Limited (HPCL) to identify and quantify the Volatile Organic Compounds (VOCs) in the ambient air at their refinery in Mumbai. We measured the VOCs for 8 hours, for 3 days, at 3 locations on a continuous basis. We then developed a protocol for sampling and analyzing VOCs in the Indian context. We also worked to interpret the amassed data with relation to Occupational Health effects.

What are VOCs?

VOCs are defined as organic compounds with boiling points (1 atm) below 260°C. They include many compounds with different physical and chemical properties with a wide range of environmental and health-related impacts, and can be emitted from both manmade and natural sources.

VOCs can cause the propagation of secondary pollutants like ozone, aldehydes and secondary organic aerosols. Some VOCs are classified as Persistent Organic Pollutants (POPs), and others as Hazardous Air Pollutants (HAPs), because of their toxicity.

What are the effects of VOCs?

- Some VOCs are known or suspected carcinogens
- May produce a strong odor
- Contribute to global warming
- Some VOCs also react with nitrogen oxides in the air in the presence of sunlight, to form ozone

Solution Overview

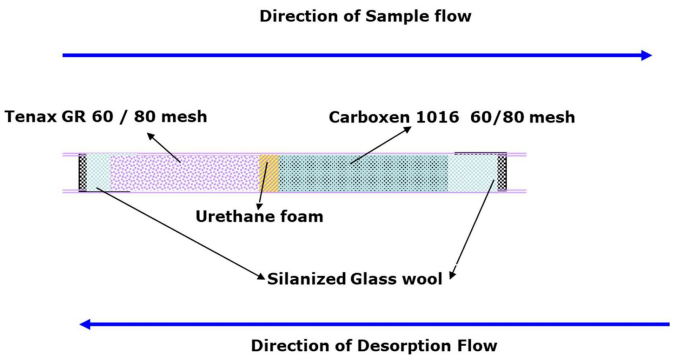
Our technique of measuring VOCs comprised of these steps:
(a) the means of sampling of air sample

(b) the means of extraction, and

(c) the means of detection of the target analytes

Active sampling was done by pumping air through a bed of sorbents in a tube, at a rate of 200 mLmin−1 range for eight hours.

Through **Thermal Desorption**, the sampling tube with exposed solid sorbent was subjected to high temperature of a range of 200°C to 380°C. The target VOCs were desorbed and collected for further analysis. The Active Thermal Desorption (ATD) combination tube comprised of Tenax and Carbopack, as shown here:



The selection of ambient air quality monitoring locations were based on wind direction, proximity to residential/commercial area, safety, availability & accessibility of locations.

Calibration Procedure:

To save time in the field, sampling pumps were pre-calibrated in the laboratory prior to arrival on-site. Following this, we assembled the calibration train using a Primary standard calibrator, sampling pump, a tube holder system and an adsorbent tube. We then turned on the pump and connected the other end of adsorbent tube to the primary calibrator, setting the required flow rate.

Field Operations:

We mobilized the pre-calibrated sampling equipment, and placed the sampling tubes depending on the source of emission. The pump and adsorbent tubes were placed on a solid stationary surface. The caps of ATD tubes were removed, to set up the sampling train with ATD tube. The Tenax end of the adsorbent tube was open to the atmosphere, while the Carbopack back up portion was directed towards the manifold of the sampler. The sampling arrangement is depicted below:

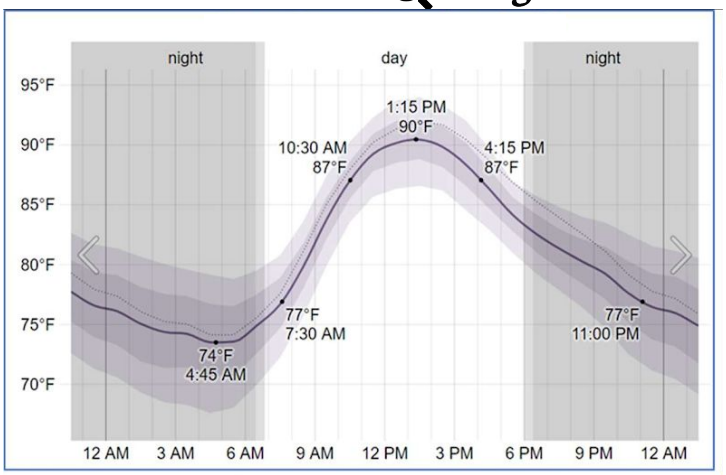
We also adjusted the time on the pump to the required sample time i.e. 8 hrs. for each cycle. The sampling flow rate of 0.2 LPM was constantly maintained at all locations. The primary calibrator was used to regularly verify the sampling flow.

Post Operating Procedure:

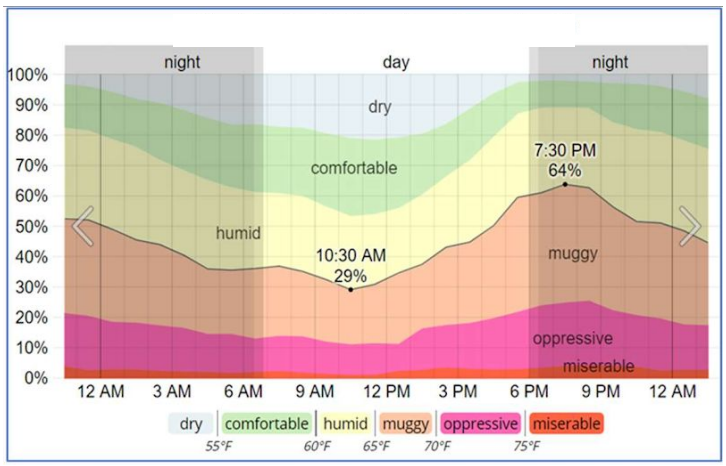
Following this, we recorded the sampling time on the air sampling data sheet, and removed the adsorbent tube from the sampling pump. The adsorbent tubes were covered with teflon tape followed by Caped adsorbent tubes and plastic caps, immediately after sampling.

After sampling, the identified samples were capped securely and kept in a cold storage box, until they were to be analysed.

The results of the quality control samples were also evaluated for contamination.



Average Temperature on November 23



Humidity Comfort Levels on November 23

Methods of Sample Analysis:

EPA TO-17 (Active Thermal Desorption) was used for the analysis of samples of Ambient Air Quality. Thermal desorption (ATD) is a complementary gas extraction technique whereby sorbent tubes are heated in a flow of carrier gas. Trapped vapours desorb from the sample tubes into the gas stream and are transferred, via a refocusing device, into the GC/MS analyser.

Advantages of Method TO-17:

- No contamination occurs since the sample is directly injected
- Wide spectrum of VOCs are captured
- Easy to capture

Results – Day 1

HPCL Mumbai Refinery - 23.11.2018				
Parameters	Unit	IETP VOC PLANT	BIOREMEDIATION PIT	ASPHALT LOADING GANTRY
		Time 10:00 to 18:00	Time 10:10 to 18:10	Time 10:20 to 18:20
Benzene	µg/m3	6.09	BDL	BDL
Toluene	µg/m3	6.72	BDL	BDL
m-Xylene	µg/m3	BDL	BDL	BDL
P-Xylene	µg/m3	BDL	BDL	BDL
Trichloroethylene	µg/m3	BDL	BDL	BDL

Results – Day 2

HPCL Mumbai Refinery - 27.11.18							
Parameters	Unit	IETP VOC PLANT		ASPHALT LOADING GANTRY		BIOREMEDIATION PIT	
		Time 16:00 to 00:00	Time 00:00 to 08:00	Time 16:10 to 00:10	Time 00:10 to 08:10	Time 16:20 to 00:20	Time 00:20 to 08:20
Benzene	µg/m3	37.19	7.97	2.97	BDL	BDL	BDL
Toluene	µg/m3	60.47	11.88	2.34	BDL	BDL	3.59
m-Xylene	µg/m3	7.19	BDL	BDL	BDL	BDL	BDL
P-Xylene	µg/m3	3.59	BDL	BDL	BDL	BDL	BDL
Trichloroethylene	µg/m3	BDL	11.56	BDL	BDL	BDL	BDL

Results – Day 3

HPCL Mumbai Refinery - 3.12.18										
Parameters	Unit	IETP VOC PLANT			ASPHALT LOADING GANTRY			BIOREMEDIATION PIT		
		1st 8 hour	2nd 8 hour	3rd 8 hour	1st 8 hour	2nd 8 hour	3rd 8 hour	1st 8 hour	2nd 8 hour	3rd 8 hour
O-Xylene	µg/m3	6.56	BDL	4.69	BDL	BDL	BDL	BDL	BDL	BDL
P-Xylene	µg/m3	19.53	BDL	12.34	BDL	BDL	BDL	BDL	BDL	BDL
Benzene	µg/m3	BDL	22.97	119.06	BDL	BDL	11.72	BDL	BDL	BDL
Toluene	µg/m3	BDL	68.91	197.03	5.16	5.47	14.69	BDL	3.91	BDL
M-Xylene	µg/m3	BDL	7.03	23.28	BDL	BDL	BDL	BDL	BDL	BDL

List of 60 Volatile Organic Compounds (VOC)s

S. No.	VOCs	S. No.	VOCs
1	Benzene	31	Trans-1,3-Dichloropropene
2	Bromobenzene	32	Ethyl Benzene
3	Bromochloromethane	33	Hexachloro-1,3-butadiene
4	Bromodichloromethane	34	Isopropylbenzene
5	Chloroform	35	Para-Isopropyltoluene
6	Bromoform	36	Methylenechloride
7	n-Butylbenzene	37	Naphthalene
8	Sec-Butylbenzene	38	2-Propylbenzene
9	Ter-Butylbenzene	39	Styrene
10	Carbon Tetra Chloride	40	1,1,1,2-Tetrachloroethane
11	Chlorobenzene	41	1,1,2,2-Tetrachloroethane
12	2-Chlorotoluene	42	Tetrachloroethene
13	4-Chlorotoluene	43	Toluene
14	Dibromochloromethane	44	1,2,3-Trichlorobenzene
15	1,2-Dibromo-3-chloropropane	45	1,2,4-Trichlorobenzene
16	1,2-Dibromoethane	46	1,1,1-Trichloroethane
17	Dibromomethane	47	1,1,2-Trichloroethane
18	1,2-Dichlorobenzene	48	Trichloroethylene
19	1,3-Dichlorobenzene	49	1,2,3-Trichloropropane
20	1,4-Dichlorobenzene	50	1,2,4-Trimethylbenzene
21	1,1-Dichloroethane	51	1,3,5-Trimethylbenzene
22	1,2-Dichloroethane	52	Xylene
23	1,1-Dichloroethene	53	Meta-Xylene
24	Cis-1,2-Dichloroethene	54	Para-Xylene
25	Trians-1,2-Dichloroethene	55	Chloroethane
26	1,2-Dichloropropane	56	Chloromethane
27	1,3-Dichloropropane	57	Trichlorofluoromethane
28	2,2-Dichloropropane	58	Bromomethane
29	1,2-Dichloropropene	59	Vinyl Chloride
30	Cis-1,3-Dichloropropene	60	Dichlorofluoromethane

We make the world, a better place to live.

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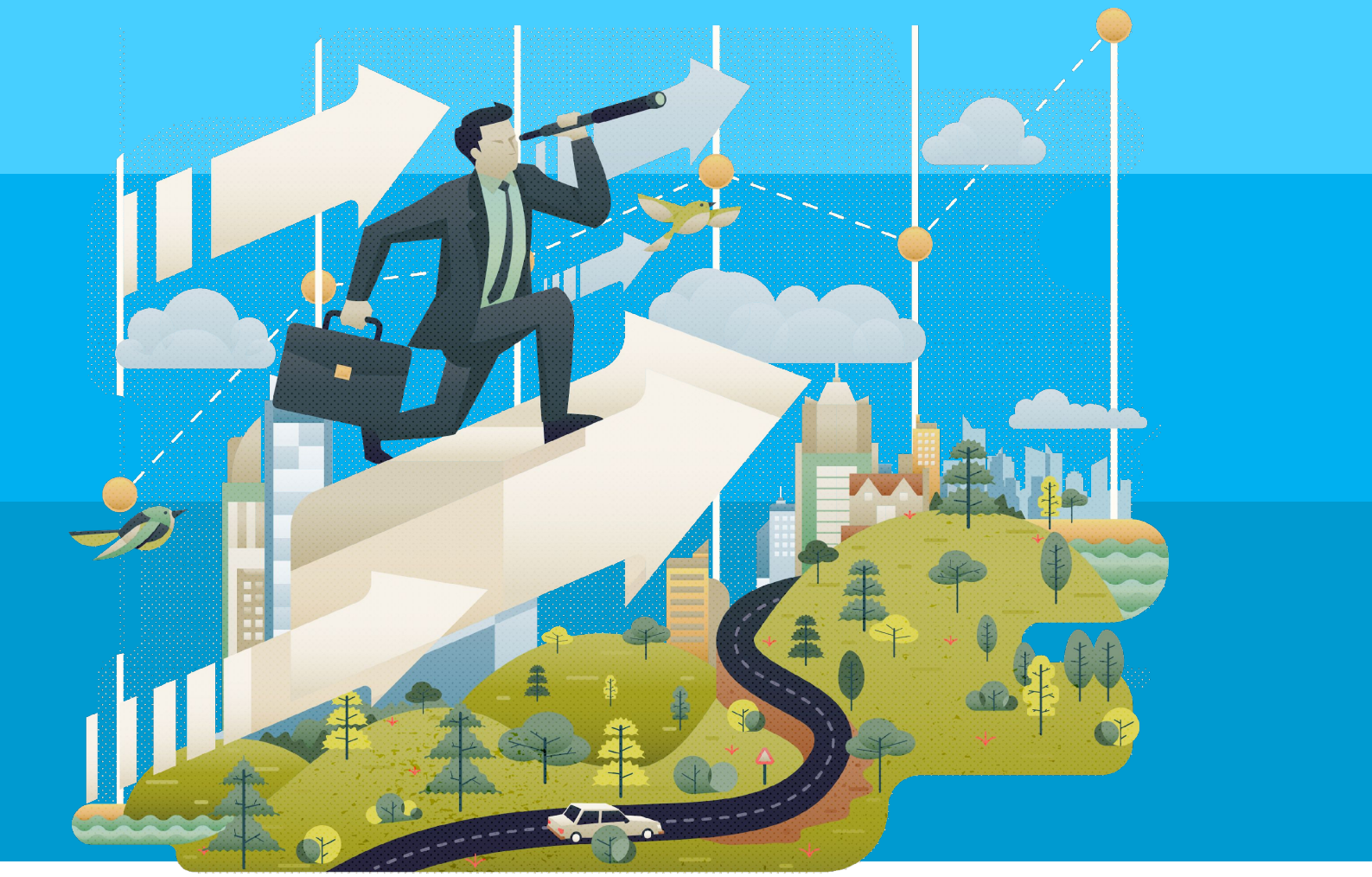

About Knowledge Lens

Knowledge Lens Private Limited, a digital technology consulting company, provides industrial artificial intelligence (AI), sustainability, and digital transformation solutions to manufacturers and enterprises across the world. Leveraging data science, analytics, and cloud, Knowledge Lens helps clients accelerate their journey towards autonomous manufacturing. Knowledge Lens offers AI-driven intelligent applications addressing manufacturers' needs across the industrial lifecycle by unifying human and machine intelligence across edge to cloud driving sustainable business outcomes

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UnifyTwin™ Revolutionizing IoT & AI for Industry 4.0

MLens High Speed Big Data Backup & Disaster Recovery Suite for Enterprise

GLens Real-time Environment Data Acquisition Monitoring & Analytics Suite

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