Assessment of Industrial Air Pollution in Jaipur Division & Its Airshed

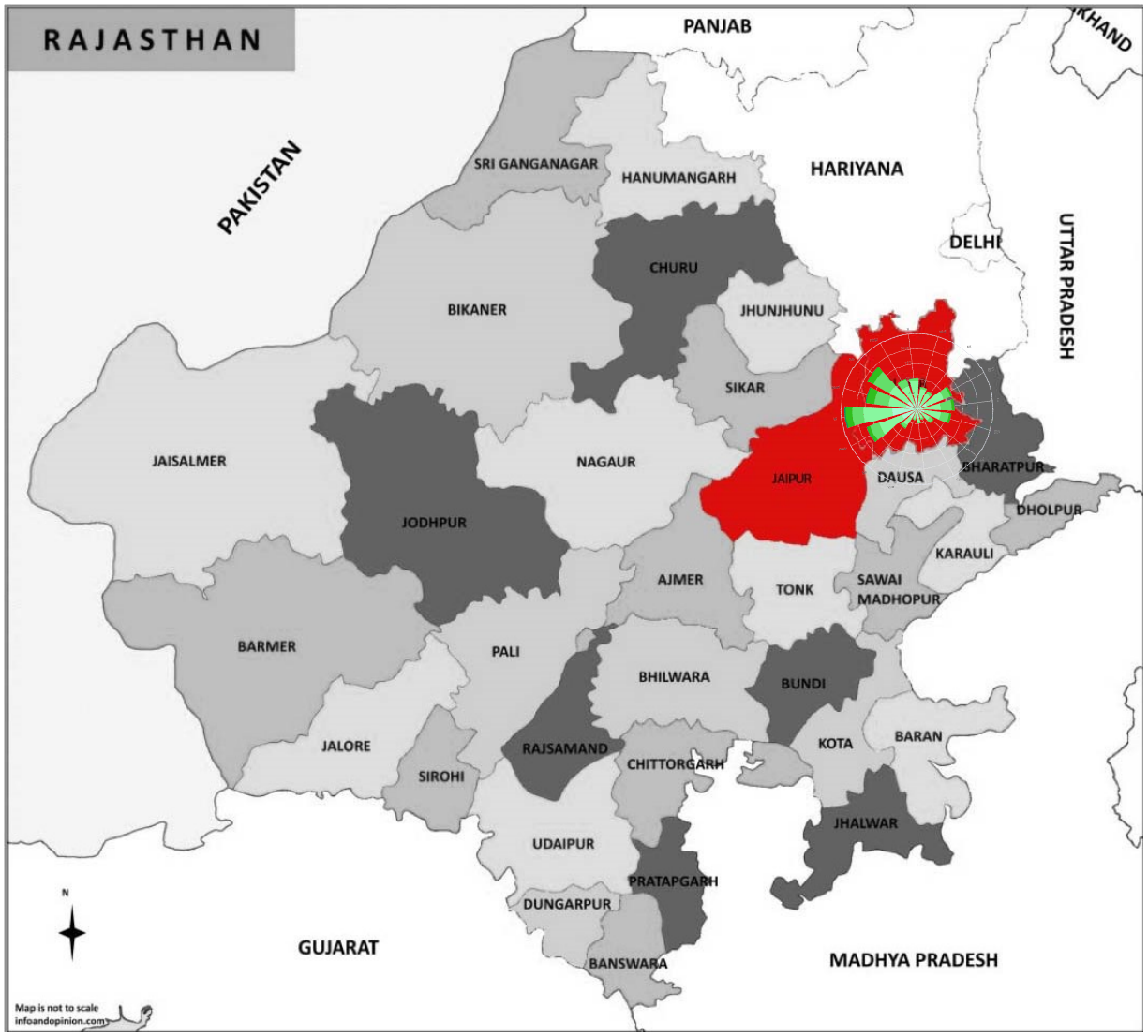
About the study

- **Objective** – To identify the industrial pollution hotspots and the major polluting sectors in the study areas and come up with a comprehensive action plan.

- **Focus** - Majorly calculation of stack emissions was done & other emission sources and issues in industrial areas were also documented

- **Data Source**: All data was sourced from RSPCB (office/website). Documentation done through on site visits.

Study Districts/Regions



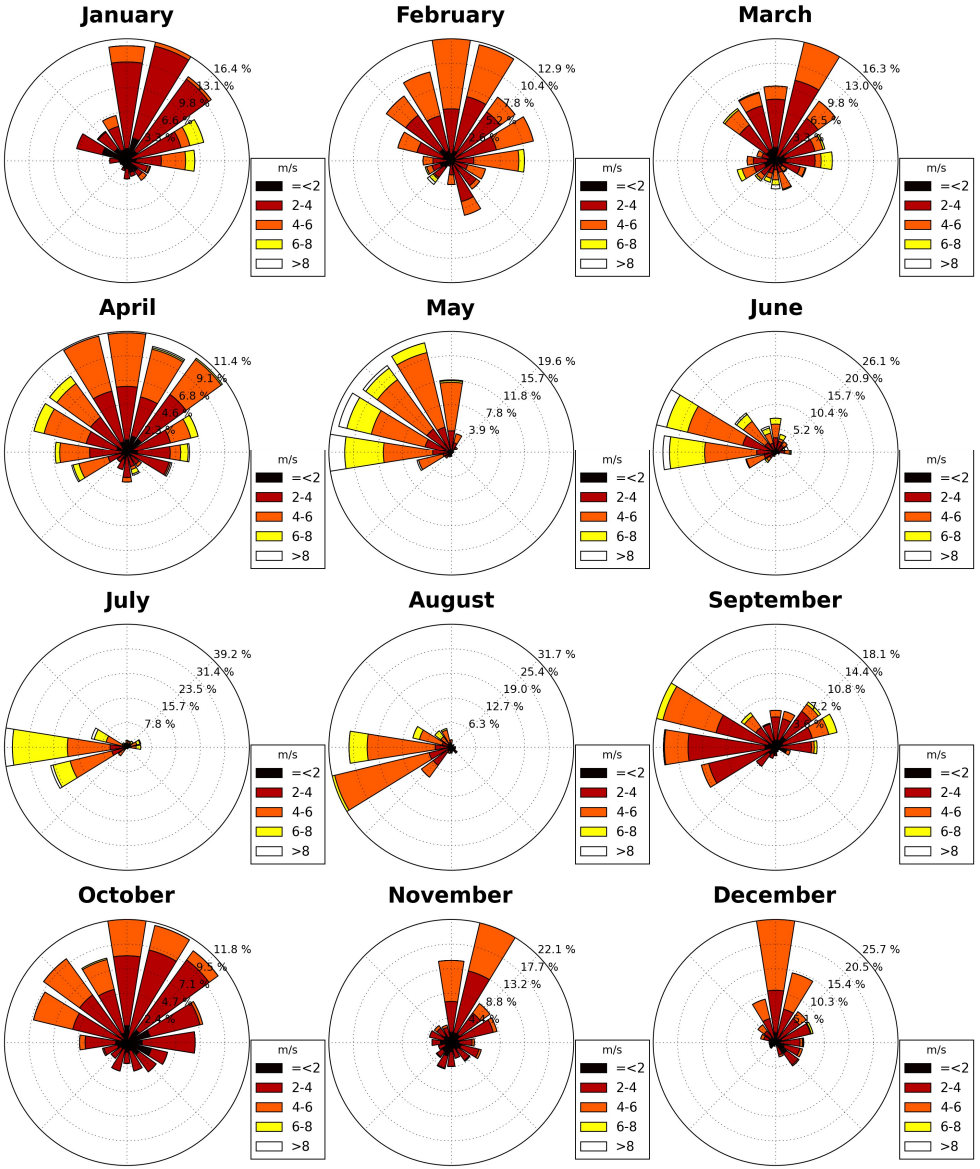
- Jaipur district

Air Shed Region Analyzed :

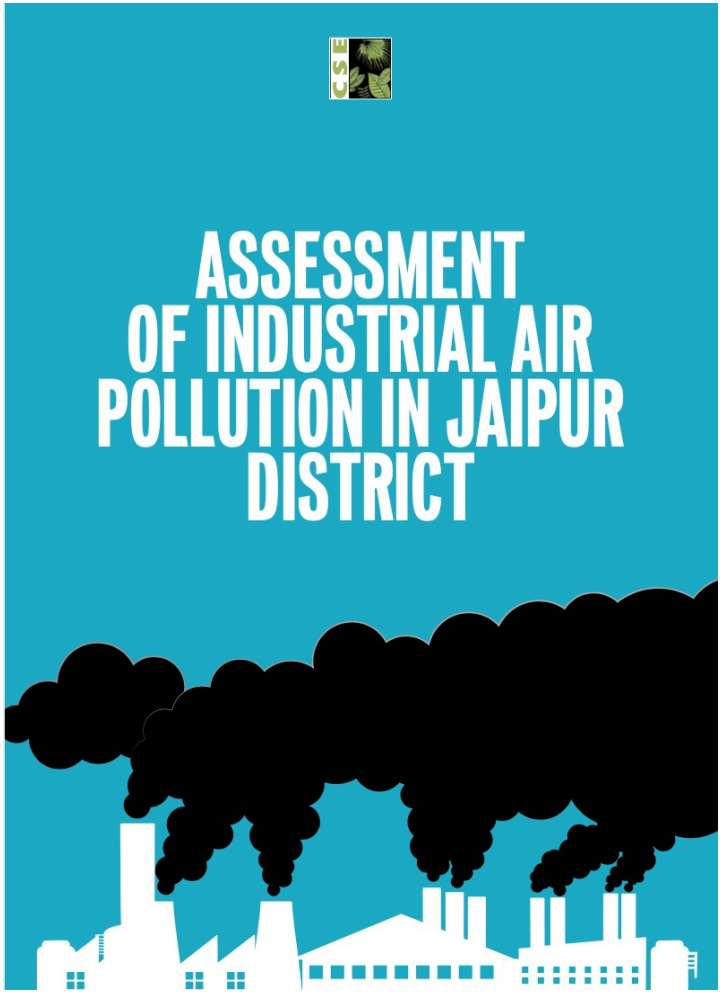
- Alwar district

- Bhiwadi region (covered separately)

Jaipur – Monthly Windrose Diagram

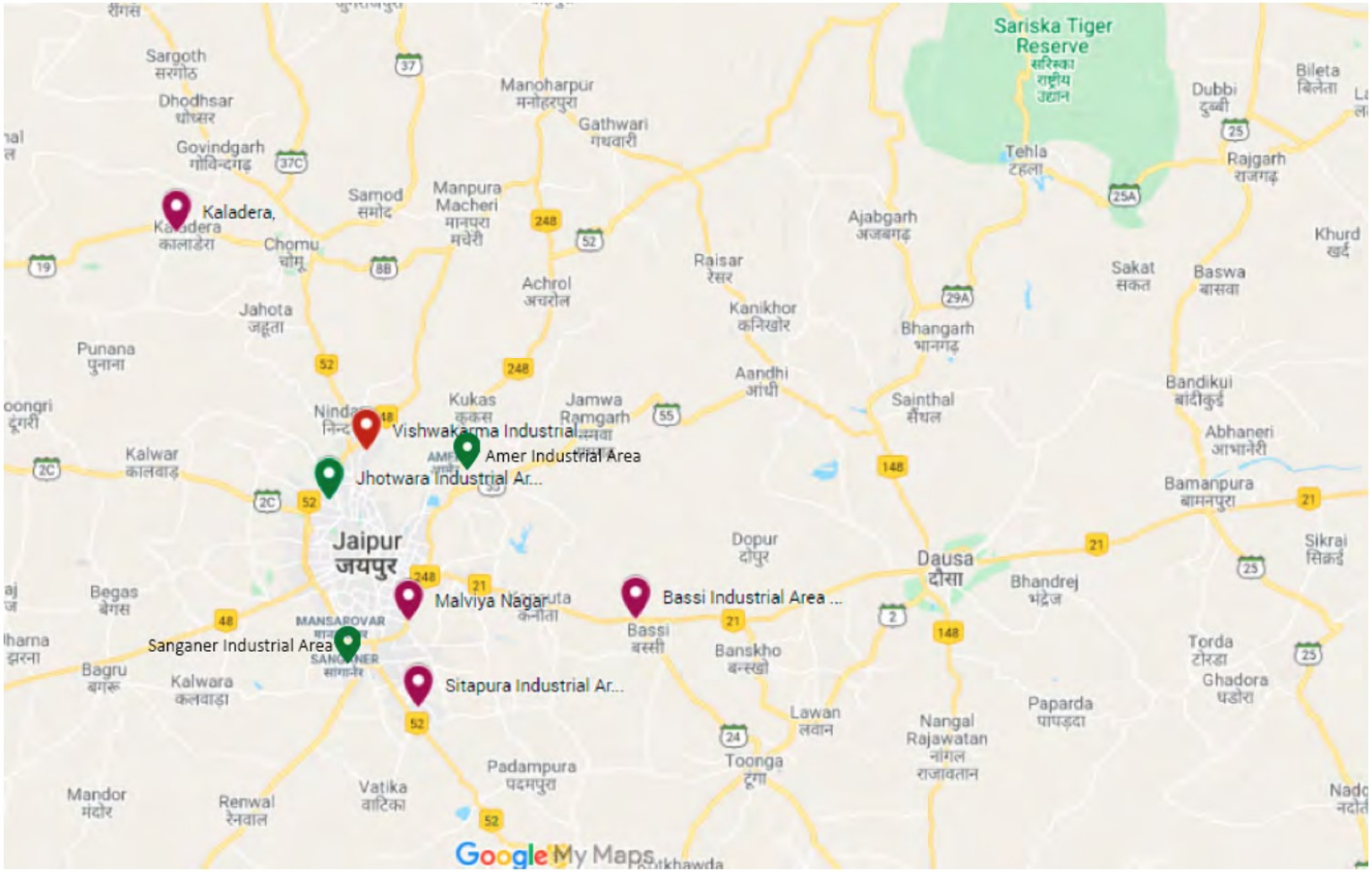


Jaipur District



- Total air polluting industries : 1261
- Major industries: Metal based, Stone works, mineral grinding, brick kilns etc.
- Overall 48 designated industrial areas
- 8 of them are major ones
- CSE's Assessment report for Jaipur (on the left) – Releasing today

Jaipur District – Major Industrial Areas



Jaipur – Industrial Combustion Equipment

Industrial combustion equipment in Jaipur district					
Furnaces		**Boilers**		**TFH**	
Capacity range (in tonnes per hour)	**Number**	**Capacity range (in tonnes per hour)**	**Number**	**Capacity range (in lakh kcal/ hr)**	**Number**
Below 3	173	Below 3	197	Below 5	63
3 to 10	21	3 to 10	11	5 to 10	11
Above 10	12	Above 10	11	Above 10	11
Total	206	Total	222	Total	87

- Large number of furnaces and boilers
- Mostly below the capacity of 3TPH

Jaipur – Industrial Fuel Consumption By Area

Industrial area	Coal (tonnes per year)	Agro residue (tonnes per year)	Liquid fuel (tonnes per year)	Wood (tonnes per year)	Gas (tonnes per year)
Jhotwara	46,270		2,739	1,828	14
Malviya Nagar	13,223		7,349	0	
Bassi	39,165	39,870	3,891	17,150	
Jaipur Rural	117,530	17,107	8,203	4,435	
Kaladera	77,361	6,415	3,745	7,392	950
Others	33,376		21,994	7,484	
Sitapura	8,356		7,903	1,861	14
VKIA	178,534	5,346	113,510	14,971	2,546
Amer	15,041		37,126		
Kotputli	76,543	72,409	7,075	475	
Sanganer	10,983		15,257	4,277	
Total	616,383	141,147	228,792	59,874	3,525

- VKIA, largest coal and liquid fuel consumer
- Kotputli largest agro residue consumer

Jaipur – Pollution Loading By Area

Industrial cluster	Pollutant (tonnes per year)						Avg. % share in total loading
	Controlled			Uncontrolled			
	PM	SO_2	NO_x	PM	SO_2	NO_x	
Jhotwara	203	135	190	509	426	508	5%
Malviya Nagar	72	79	84	176	358	176	2%
Bassi	329	247	352	725	421	528	7%
Jaipur Rural	559	384	537	1,401	1,128	1,307	14%
Kaladera	368	246	351	899	684	868	9%
Others	217	244	260	482	1029	493	7%
Sitapura	60	76	77	132	344	135	2%
VKIA	1,072	1,216	1,277	2,517	5,352	2,513	33%
Amer	151	275	234	338	1,443	344	6%
Kotputli	509	374	527	1,281	796	886	12%
Sanganer	97	137	132	203	628	210	3%
Total	3,637	3,414	4,019	8,664	12,609	7,969	

Source: CSE 2019–2020 (based on RSPCB data)

- VKIA is largest share holding hotspot, followed by Kotputli and Kaladera.

Jaipur – Industrial Fuel Consumption By Sector

Sector	Coal (tonnes per year)	Agro residue (tonnes per year)	Wood (tonnes per year)	Gas (tonnes per year)	Liquid fuel (tonnes per year)
Building and construction	-	-	-	-	15,434
Cement	4,673	-	-	-	1,910
Ceramics and refractories	54,886	1,810	-	-	1,344
Chemical/pharmaceuticals	12,189	-	634	-	2,321
Engineering	10,969	8,019	-	1,782	7,802
Food	101,338	89,321	18,648	-	21,479
Footwear and leather	10,211	-	158	-	1,408
Metal	197,812	-	-	371	51,759
Miscellaneous	80,932	39,798	10,501	371	45,321
Plastics	9,451	-	-	950	3,919
Plywood and laminates	25,102	2,199	20,740	-	1,669
Stone-work		-	-	-	4,761
Textiles	35,148	-	-	-	3,194
Commercial units	73,674	-	9,194	52	66,470
Total	616,383	141,147	59,874	3,525	228,792

Source: CSE 2019–2020 (based on RSPCB data)

- Metal and Food Processing largest coal consuming sectors
- Food Processing is largest agro residue consuming sector.

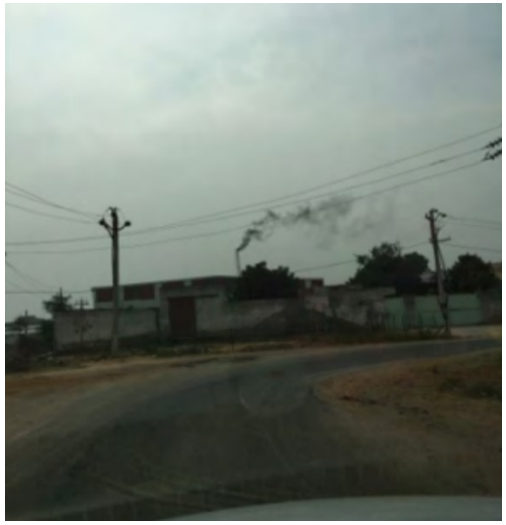
Jaipur – Pollution Loading By Sector

Sector	Avg. % share in total loading	Pollutant (tonnes per year)					
		Controlled			Uncontrolled		
		PM	SO_2	NO_x	PM	SO_2	NO_x
Building and construction	2%	37	99	74	74	556	77
Cement	1%	24	24	26	59	102	59
Ceramics and refractories	6%	233	146	212	599	437	585
Chemical/pharmaceutical	2%	58	46	58	142	170	143
Engineering	2%	83	92	101	202	358	159
Food	18%	752	612	814	1,770	1,494	1,306
Footwear and leather	1%	46	34	45	115	123	123
Metal	26%	936	813	971	2,346	3,262	2,341
Miscellaneous	16%	576	595	675	1,347	2,206	1,147
Plastics	1.4%	48	48	53	119	208	119
Plywood and laminates	4%	186	135	195	350	242	362
Stone-work	1%	11	31	23	23	171	24
Textiles	4%	152	106	144	388	364	386
Commercial units	16%	495	632	628	1,129	2,916	1,147

Source: CSE 2019–2020 (based on RSPCB data)

- Metal and Food Processing sectors are the largest contributors.
- DG sets in Commercial units need an immediate stratergy

Jaipur – Pictures from Site Visits



Plywood Industries – Bassi Industrial Area

VKIA

Metal Industries– Chomu Industrial Area

Jaipur Industrial Areas : Other Sources

Non- Hazardous Industrial Waste

Poor Condition of Roads

Stone Works

Air Shed Region Analysis

Alwar District

- Total air polluting industries : 156
- Major industries: Food processing & mineral grinding
- Overall 15 major designated industrial areas
- Bhiwadi region assessed separately
- CSE's Assessment report for Alwar (a part of Delhi NCR report)
- City Action Plan seems insufficient

Alwar District – Major Industrial Areas

Source: CSE, 2019

Alwar – Industrial Combustion Equipment

Equipment	Alwar
Furnace	54
Boiler	63
<2 TPH	44
2–<10 TPH	8
10–<15 TPH	5
>15 TPH	6
TFH	5
Up to 10 lakh kcal/hr	3
11–20 lakh kcal	1
>20 lakh kcal/hr	1

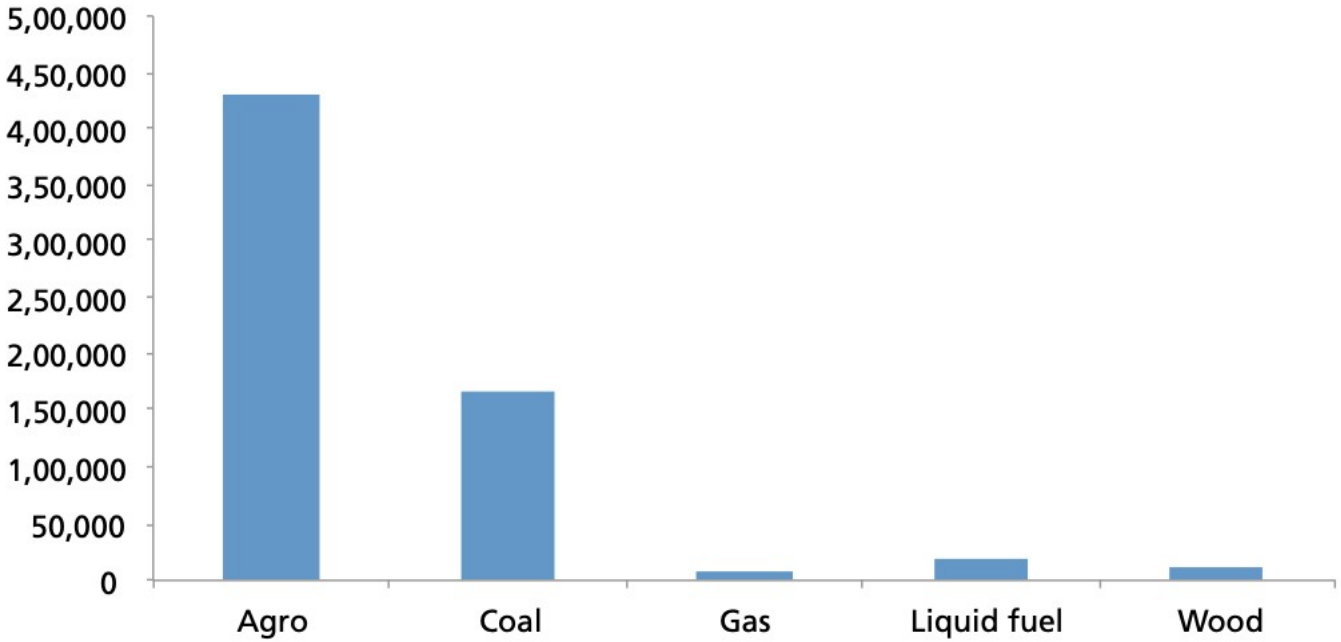
- Large number of furnaces and boilers
- Most boilers below the capacity of 2 TPH

Alwar – Industrial Fuel Consumption By Area

Industrial area	Fuel (in tonnes per year)				
	Agro	Coal	Gas	Liquid fuel	Wood
Behror	23,522	14,190	-	317	
Khaithal	-	1,485	-	-	-
MIA	107,668	104,366	238	2,915	10,204
Neemrana	149,688	12,870	5,802	3,150	352
Old Industrial Area	24,592	990	-	-	910
Other	94,090	2,396	356	10,488	-
Shahjahanpur	29,938	13,068	-	468	-
Sotanala	2,138	14,989	-	507	-
Total	431,636	164,354	6,396	17,845	11,466

- MIA, largest coal consumer
- Neemrana largest agro residue consumer

Alwar – Industrial Fuel Consumption By Area



- A district with more agro consumption than coal.

Alwar – Pollution Loading By Area

Industrial cluster	Pollutant (tonnes per year)						Avg. % share in total loading
	Controlled			Uncontrolled			
	PM	SO_2	NO_x	PM	SO_2	NO_x	
Behror	116	82	122	293	112	165	6.5%
Khairthal	6	4	5	16	11	16	0.4%
MIA	734	512	754	1797	845	1,221	43.3%
Neemrana	427	345	502	1,051	204	243	20.0%
Old Industrial Area	67	53	80	161	7	29	2.8%
Others	265	257	335	640	395	134	15.4%
Shahjahanpur	128	93	138	320	109	158	6.9%
Sotanala	68	44	63	174	124	162	4.7%
Total	1,811	1,390	1,998	4,453	1,807	2,127	

- MIA and Neemrana together contribute more than 60% to the industrial pollution load of the district.

Alwar – Industrial Fuel Consumption By Sector

Industrial sector	Agro	Coal	Gas	Liquid fuel	Wood
Ceramics and refractory		713	594	845	
Chemical	32,076	8,395	356	2,513	11,114
Distillery	218,117	23,760			
Electronics & home appliances	29,938	2,673	277	468	
Engineering		12,870	2,776	1,818	
Food and food Processing	87,353	44,392	1,970	9,260	
Metal-based		19,741	238	1,056	
Miscellaneous	32,076	20,348	185	1,425	352
Pharmaceuticals	3,208	990		459	
Rubber products		6,633			
Textile	28,868	22,770			
Waste management		1,069			
Total	431,636	164,354	6,396	17,844	11,466

- Food Processing largest coal consuming sector
- Distillery is the largest agro residue consuming sector.

Alwar – Pollution Loading By Sector

Sector	Avg. % share in total loading	Pollutant (tonnes/year)					
		Controlled			Uncontrolled		
		PM	SO_2	NO_x	PM	SO_2	NO_x
Ceramics and refractory	0.6%	5	7	7	12	35	12
Chemical	8.5%	158	131	184	327	152	167
Distillery	28.0%	630	484	725	1,561	168	381
Electronics and home appliances	3.9%	85	68	100	210	36	48
Engineering	4.6%	57	43	56	145	156	145
Food processing	26.0%	418	338	462	1,039	647	566
Metal-based	6.2%	84	55	77	214	178	178
Miscellaneous	9.7%	166	122	176	416	195	242
Pharmaceuticals	0.8%	13	11.6	15.2	32	23.5	14.6
Rubber products	1.9%	27.2	16.1	24.2	70.3	46.9	69.8
Textile	9.3%	163.8	111.7	167.6	414.6	161	257
Waste management	0.5%	4.4	2.6	3.9	11.3	7.6	11.3

- Distillery and Food Processing sectors are the largest contributors.
- These 4 sectors contribute almost 70% to industrial pollution load.

Alwar – The Hub of Mineral Grinding

Matsya Industrial Area

Fugitive emissions – Need to be controlled

Rajgarh Industrial Area

Alwar Industrial Areas : Poor Roads and Industrial Waste

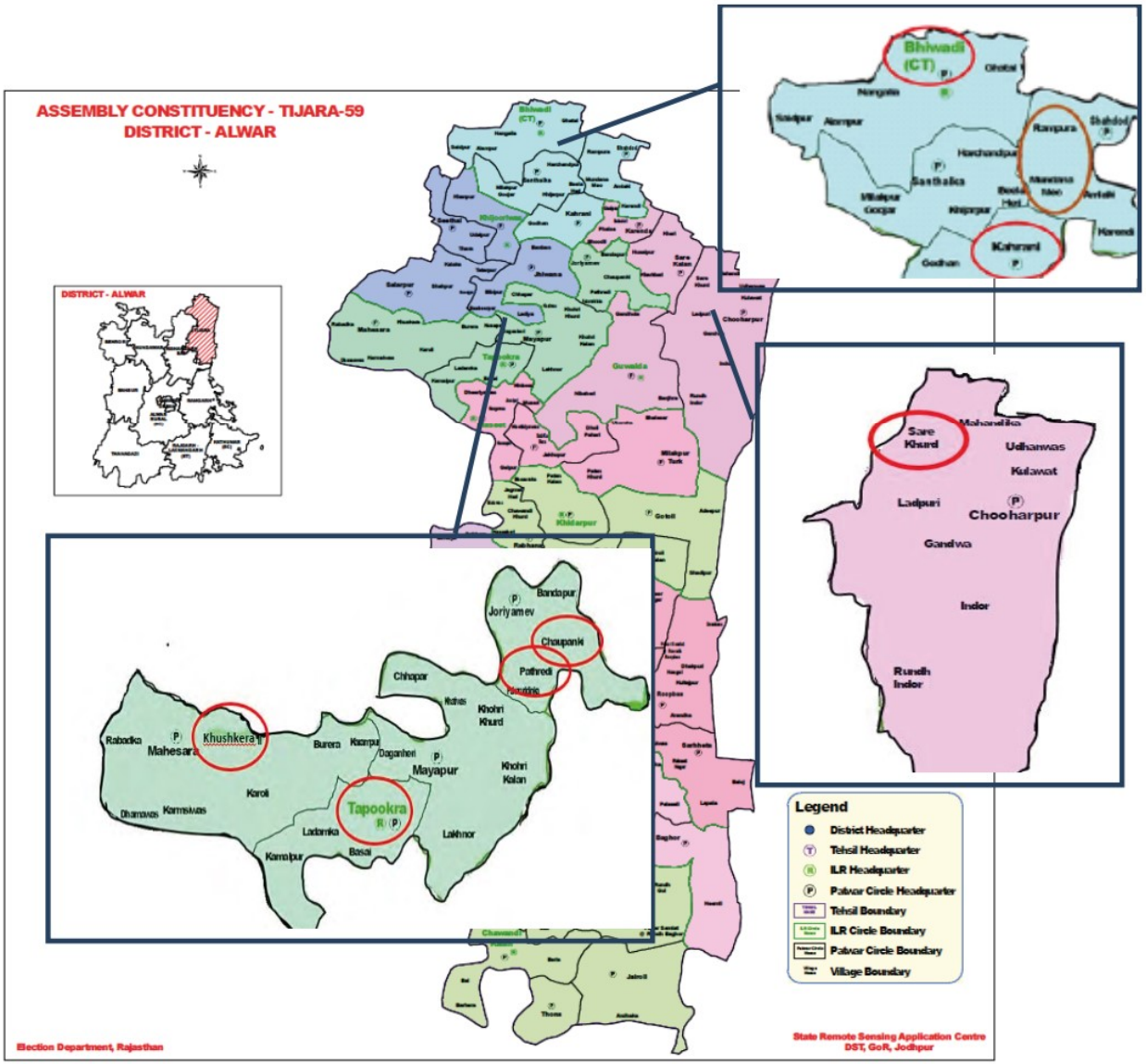
Poor Condition of Roads in MIA

Non- Hazardous Industrial Waste in Neemrana

Bhiwadi Region

- Total air polluting industries : 328
- Major industries: Metal Based & Chemical/Pharmaceutical
- Overall 3 major designated industrial areas – Bhiwadi, Chopanki & Khuskhera
- CSE's Assessment report for Bhiwadi (a part of Delhi NCR report)

Bhiwadi Region – Major Industrial Areas



Bhiwadi – Industrial Combustion Equipment

Capacity range	No.
Boiler	
<1	34
1 to 3	46
4 to 6	16
7 to 15	13
>15	2
Thermopack	
Up to 10 lakh kcal/hr	69
11–20 lakh kcal	14
>20 lakh kcal/hr	6
Furnace (melting furnace, reheating furnace, etc.)	264

- Large number of furnaces
- Majority boilers below the capacity of 3 TPH

Bhiwadi – Industrial Fuel Consumption By Area

Industrial area	Agro fuel	Coal	Wood	Liquid fuel
Bhiwadi	48,098	192,436	26,344	17,156
Chopanki	25,684	44,303	5,656	19,254
Khushkhera	5,181	36,092	4,594	4,883
Total	78,962	272,831	36,594	41,293

- Bhiwadi Industrial Area, largest coal, agro and wood consumer.
- Chopanki Industrial Area is the largest liquid fuel consumer.

Alwar – Pollution Loading By Area

Industrial cluster	Pollutant (tonnes per year)						Avg. % share in total loading
	Controlled			Uncontrolled			
	PM	SO_2	NO_x	PM	SO_2	NO_x	
Bhiwadi 1 to 4	1,042	747	1,038	2,491	1,984	2,251	65%
Chopanki	311	298	354	734	1,008	602	23%
Khushkhera	189	142	190	451	432	427	12%
Total	1,542	1,187	1,582	3,675	3,424	3,280	

- Bhiwadi Industrial Area contributes around 65% to the industrial pollution load of the region.

Bhiwadi – Industrial Fuel Consumption By Sector

Industrial sector	Agro fuel	Coal	Wood	Liquid fuel	Total
Ceramics	-	13,200	-	337	13,537
Chemicals/ pharmaceuticals	34,683	88,589	21,763	11,299	156,334
Food processing	17,005	8,366	1,089	3,829	30,289
Leather/footwear	-	512	-	471	983
Metal industry	-	85,912	2,970	20,796	109,678
Miscellaneous	2,079	13,365	1,551	2,191	19,186
Plywood	-	12,870	2,310	-	15,180
Rubber goods	1,155	30,690	660	239	32,744
Synthetic resin/ plastics/packaging	21,400	18,437	4,983	2,132	46,952
Textile	2,640	891	1,267	-	4,798
Total	78,962	272,832	36,593	41,294	429,680

- Chemical and Metal sector largest coal consumers
- Chemical is the largest agro residue consuming sector.

Bhiwadi – Pollution Loading By Sector

Sector	Avg. % share in total loading	Pollutant (tonnes per year)					
		Controlled			Uncontrolled		
		PM	SO_2	NO_x	PM	SO_2	NO_x
Metal industry	30%	413	351	426	1,020	1,357	1,021
Rubber goods	8%	132	80	119	335	226	328
Chemicals/pharmaceuticals	34%	553	418	572	1,267	1,038	1,102
Synthetic resin/plastics/packaging	9%	151	115	162	349	208	239
Food processing	6%	89	81	103	212	197	122
Ceramics	3%	55	34	50	142	105	141
Miscellaneous	5%	71	55	72	169	174	174
Plywood	4%	61	38	57	143	92	145
Textile	1%	15	11	16	29		16
Leather	0.3%	3	4	4	8	21	8

- Chemical and Metal sectors are the largest contributors.
- These 2 sectors contribute almost 64% of the total industrial pollution load.

Bhiwadi Industrial Areas : Poor Roads and Industrial Waste

Way Ahead : Action Points

- **Focus**ed monitoring and actions for **pollution hotspots** and **major polluting sectors** identified.
- **CEMS data** – to be in public domain, improve data quality, use for detterence
- **Switching to Cleaner Fuel** – Clean Fuel Infrastructure in rest of Alwar and Jaipur
- **Common boilers** wherever feasible in case of small boilers
- **Induction Furnaces** to be made mandatory (especially in Jaipur)

Way Ahead : Action Points

- **Combatting fugitive emissions** - Strict adherence to RSPCB mineral grinding and Stone Crusher guidelines specially in Rajgarh and MIA

- **Waste Management** agencies to be involved for non-hazardous industrial waste along with guarded dump sites – a good initiative been taken in Bhiwadi. But regular monitoring of their work is essential.

- The **roads should be constructed of cement concrete** to be able to take heavy vehicle movement. Should be **repaired regularly**.

- Every industry should have **color coded boards** with **consent details** to **identify illegal industries**

THANK YOU