



B R E A T H E



**CHAKR INNOVATION**  
*REVOLUTION THROUGH POLLUTION*

Source: Painting by a Delhi-based Graffiti artist using ink generated from a Chakr device

[www.chakr.in](http://www.chakr.in)

# Air Pollution poses a grave threat

PM10, PM2.5 matter responsible for major health diseases

**Threat of air pollution is a real and grave issue...**

- 4<sup>th</sup> leading cause of death globally
- Causes 3 million deaths per year
- 88% of these deaths occur in developing nations

**... and PM 10, PM 2.5 are the key culprits of ambient air pollution**

PM10 and PM2.5 responsible for **major health scares**



Respiratory diseases incl. Asthma and Chronic Obstructive Pulmonary Disease



Cardiovascular diseases incl. Stroke and Ischemic Heart Disease



Cancer PM2.5 from diesel exhaust is a Class I carcinogen (WHO)



pre-term births - 18% higher likelihood

**Global warming potential for PM is ~ 460 times that of CO<sub>2</sub>** 



# Chakr Shield: Captures 90% emissions

Retrofit solution to capture emissions without adverse impact

Novel Solution  
based  
Technology



Novel Technology - Patent filed in Jan 2016

Our  
Technology in  
Action



**No adverse impact on engine:**

Minimal back-pressure (<1/10<sup>th</sup> of limit)



**Minimal additional energy:**

<1% of the capacity used for operations



**Certified PM Reduction:**

Tested by accredited labs for **90% reduction**



**Long Product life**

Robust product with 10-15 years' life



**Low Maintenance Needs**

No consumables; Collection **once in 4-6 months**



**Reusable by-products**

No dumping or burning-off of captured pollution



# Pollution abated and circulated back to use

Captured PM can be used as black carbon pigment for inks and paints

Captured Soot  
PM2.5 and PM10

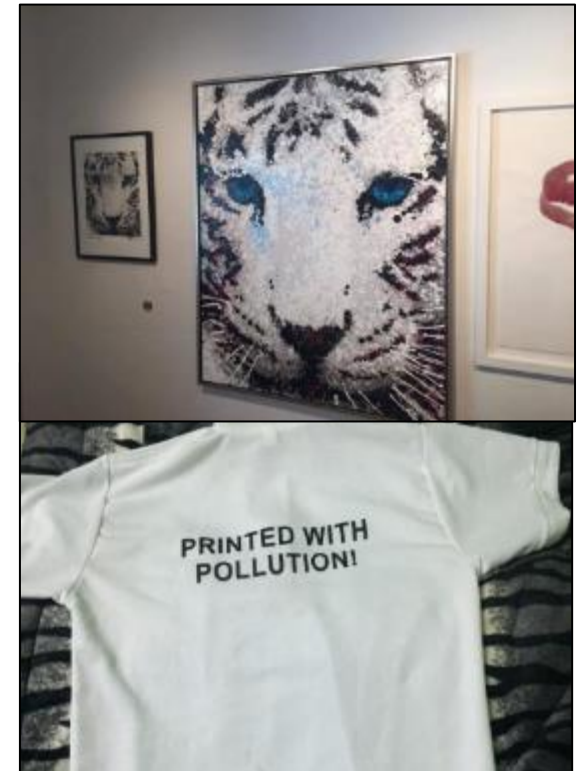


Processed  
Ink Pigment



Certified fit  
for use:  
Passed  
toxicology  
tests

Captured Pollution  
In Use!



# Industrial collaboration for further product development



## R&D Support + Grant by Leading Oil Sector PSU

Grant and R&D support to develop device for refinery

- INR 2.5 Cr grant money for PoC and product development
- R&D and testing avenue for prototype validation



## R&D Support by Leading Technology Supplier

R&D, mentorship support as a part of DNA Program for

- Technology commercialization
- Product research and development



## Impact Study with University of Chicago Trust's

Winner of Urban Labs Innovation Challenge grant of ~INR 0.5 Cr

- Pilot impact study for technology
- Policy recommendations based on study



# Recognitions and Awards

Received 10+ awards from esteemed organizations



Urban Labs Innovation Challenge, University of Chicago - **Winner**



Hon. Prime Minister Modi's Champions of Change - **Invited Participant**



American Society of Mechanical Engineers - **Top 3 start-ups**



**Forbes 30 Under 30** Global for Social Entrepreneurship, 2018



General Atlantic Echoing Green Global Fellowship, 2017: **Winners**



MIT GSW (Global Startup Workshop), 2016: **Runners up**



Global Sourcing Council 3S Award for Climate Change at the United Nations HQ: **Runners up**



India Innovation Growth Program by Department of Science and Technology, Government of India and Stanford Business School, 2016: **Second Runners up**



# Chakr Core Team



**Kushagra Srivastava**  
*CEO*

**IIT Delhi**  
**Textile Engineering**  
**Echoing Green Fellow**



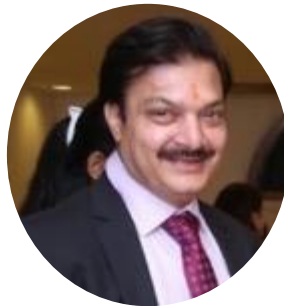
**Arpit Dhupar**  
*CTO*

**IIT Delhi**  
**Applied Mechanics**  
**Echoing Green Fellow**



**Prateek Sachan**  
*COO*

**IIT Delhi**  
**Chemical Engineering**



**Alok Goyal**  
*Business Development*

**IIT Roorkee**  
**Prev. Head - Energy Ser. SGS**  
**VP & Head, Airtel**



**Bharti Singhla**  
*Strategy*

**IIT Delhi**  
**Chemical Engineering**  
**Prev. As-Consultant BCG**



**Tushar Batham**  
*R&D*

**Mechanical Engineering**  
**MBA from SPJIMR**  
**Prev. GM at Cummins India, Mahindra**



# Advisors and Mentors



**Raghavan Ramanan**  
*Strategic Advisor*

Uni. of Texas, Dallas  
PhD, MBA, PE, BCEE  
Affiliate Prof., DRI NV



**Dr. J. P. Gupta**  
*Policy Advisor*

Chairman EIA  
PhD, Uni of Toronto



**Dr. B. Sengpta**  
*Policy Advisor*

Former Member  
Secretary, CPCB

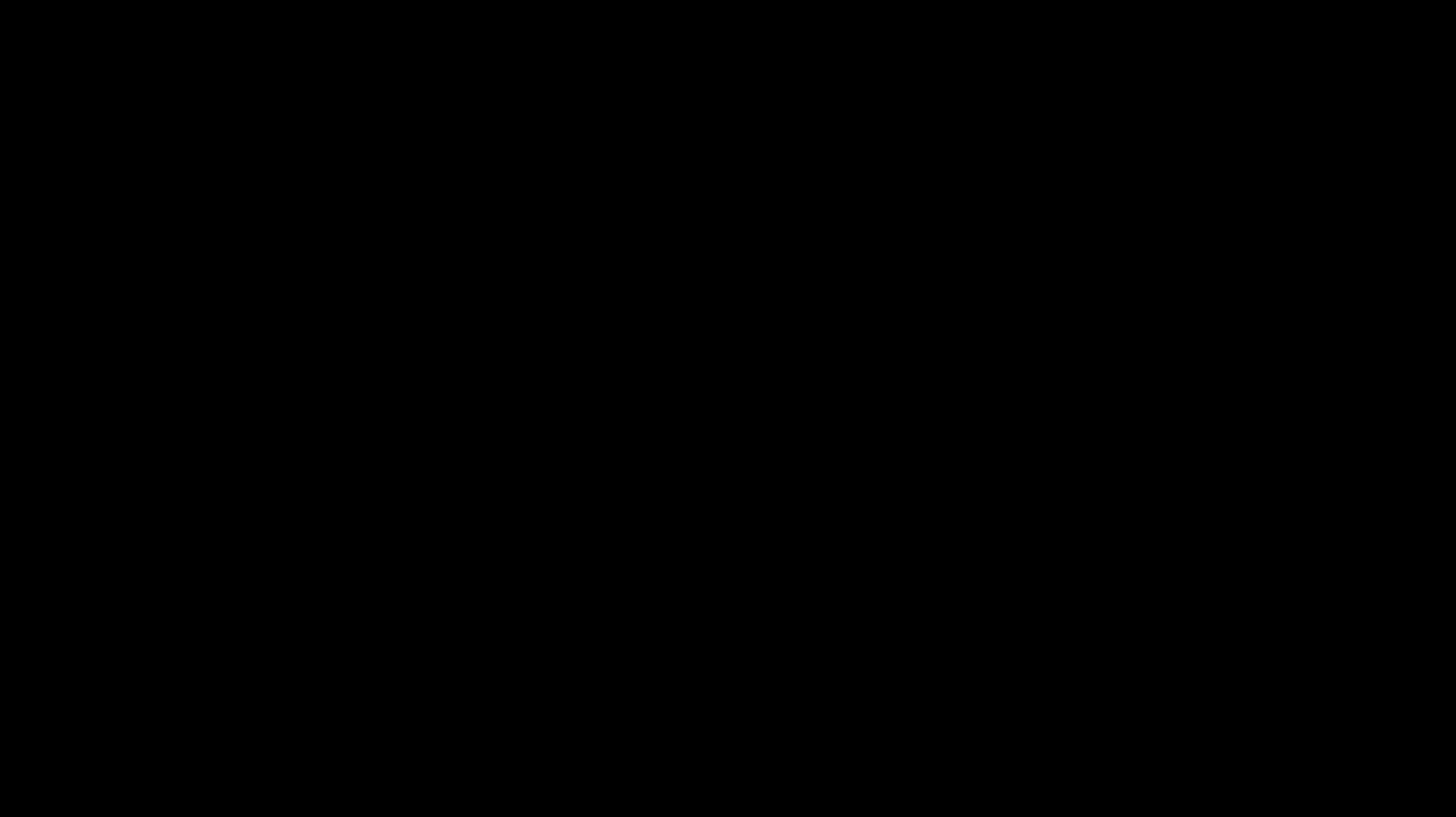


**Mr. S. P. Purwar**  
*Telecom Advisor*

Head Telecom, JSA  
Former Director MTNL,  
Finance Director BSNL







***Let us create a greener tomorrow!***



***Thank you!***