CHAKR INNOVATION

REVOLUTION THROUGH POLLUTION

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

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...

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

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 CO₂

Chakr Shield: Captures 90% emissions
Retrofit solution to capture emissions without adverse impact

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Details</th>
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<tbody>
<tr>
<td>No adverse impact on engine:</td>
<td>Minimal back-pressure (&lt;1/10\textsuperscript{th} of limit)</td>
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<td>Minimal additional energy:</td>
<td>&lt;1% of the capacity used for operations</td>
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<td>Certified PM Reduction:</td>
<td>Tested by accredited labs for 90% reduction</td>
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<td>Long Product life</td>
<td>Robust product with 10-15 years’ life</td>
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<td>Low Maintenance Needs</td>
<td>No consumables; Collection once in 4-6 months</td>
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<td>Reusable by-products</td>
<td>No dumping of burning-off of captured pollution</td>
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Novel Solution based Technology

Novel Technology - Patent filed in Jan 2016

Our Technology in Action
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

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Textile Engineering
Echoing Green Fellow

Arpit Dhupar
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Applied Mechanics
Echoing Green Fellow

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**Telecom Advisor**  
Head Telecom, JSA  
Former Director MTNL, Finance Director BSNL
Let us create a greener tomorrow!

Thank you!

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