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Accelerating the Imperative: Green Technology Deployment

Closing the Knowledge Gap

Sources of Green Technology Information, Assembling Sets of Technologies for different audiences

1st November 2023, WIPO, Geneva

Presentation By

Commodore Amit Rastogi (Retd.)

Chairman and Managing Director

NATIONAL RESEARCH DEVELOPMENT CORPORATION

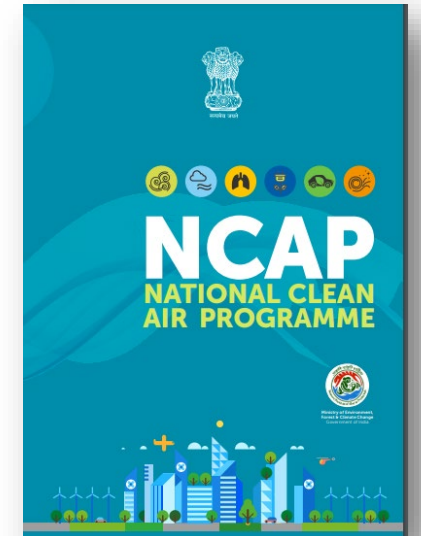
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Promoting Innovation, Transforming Lives



India's Effort to adopt Green Technologies in India

- **National Green Hydrogen Mission:** Mission aims to make India a 'global hub' for using, producing and exporting green hydrogen.
- **National Solar Mission:** Establish India as a global leader in solar energy, by creating the policy conditions for its diffusion across the country as quickly as possible.
- **Waste to Wealth Mission:** Identify, develop, and deploy technologies to treat waste to generate energy, recycle materials, and extract resources of value.
- **National Clean Air Programme:** Ensure stringent implementation of mitigation measures for prevention, control and abatement of air pollution.





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National Research Development Corporation

- Incorporated in **1953** under the administrative control of the **Department of Scientific & Industrial Research, Ministry of Science & Technology, GoI**
- **Mandate: Nurture, Promote, Commercialise** indigenously developed technologies from **Universities, National R&D Institutions, Individual Inventors, etc.**
- Specialize in **Technology Transfer, IP Portfolio Management and Project Consultancy**
- Catalyze **conversion of lab-scale R&D** into marketable technologies
- **Technical & Financial support** for technology up-gradation
- **Pioneer Technology Transfer Organization of India**





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NRDC - India's Leading Technology Transfer Organization

70 Years of Experience In Tech. Transfer, IP Management, Incubation & Start-ups



2000+ Patents filed in India & abroad



450+ Awareness Programmes for IPR Promotion



10,000 Start-ups supported



5000+ Technology license agreements signed



50,000 Scientists technocrats sensitised in IPR



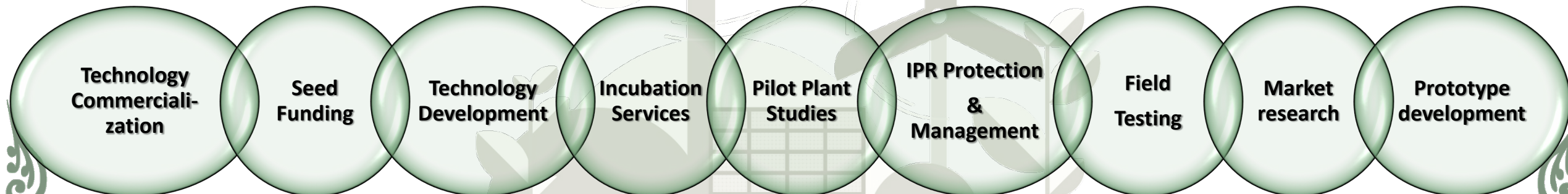
2500+ Technologies available for Commercialisation

Pioneer Technology Transfer Organization of India

Bridge Between IP Generators & Industry



Value Addition by NRDC



NRDC's 360° Support to Startups

IPR Filing Support
Filed More Than
2000 IPRs



Incubation Facility
Incubated More
than 50 Startups



**Technology Devt.
Validation &
Commercialisation**
Support upto 0.25M
USD per Start-Up



**Industry Interaction
Meets**
Conducted more
than 50 sector
specific meets



Seed Funding
Support up to
0.05M USD



**Access to
Technology
Databank**
Handholding for
Various
Technologies



**Commercialisation
Support**
Support to
startups from Lab
Scale to
Commercial Scale



**Dissemination on
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Technologies**
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Foreign Collaborations

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Technology partner for promoting environment friendly innovations



U.S IP Consulate



Innovation, IP Commercialization & Technology Transfer



Addressing challenges through technological innovations in the fields of agriculture & rural development



DG, AARDO



Capacity building in intellectual property and commercialization of IPRs.



DG-WIPO



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SNAPSHOT OF FEW GREEN TECHNOLOGIES FROM INDIA



R& D institution

Sustainable Aviation Fuels (SAF)

About the Technology

- Conversion of plant-derived oils, animal fats and used cooking oil into SAF

Sector

- Energy

Stage of Development

- Scaling

USP

- Single-step, non-noble metal-based catalytic process and has low sulfur content

Challenges mitigated

- Improving air quality and reducing Greenhouse Gas Emissions



IAF'S AN-32 high altitude landing at Leh, India on 31st January 2020



AN-32 Flying on 26th Jan 2019 over Rajpath, Delhi

University

Manufacture of Graphene from Waste Plastic

About the Technology

- Waste plastics is recycled to produce nearly about 12-15% fine quality carbon nano materials (Graphene), 25-40% value added fuels and 15-25 % gaseous fuels.

Sector

- Pollution & Waste

Stage of Development

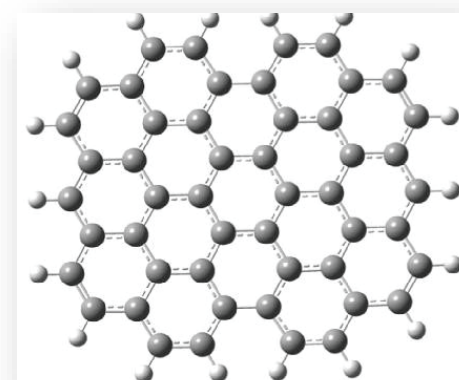
- Scaling

USP

- Low-cost, energy efficient & environment friendly process

Challenges mitigated

- Solution for solid waste management and pollution control



R& D institution

Marine Oil Spill Bioremediation Technology

About the
Technology

- Process of using consortium of hydrocarbonoclastic bacteria from deep-sea for the removal of toxic and harmful petroleum hydrocarbons

Sector

- Pollution & Waste

Stage of
Development

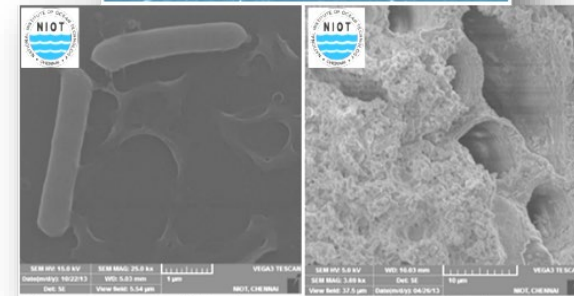
- Commercialised

USP

- Low cost & eco-friendly process (Bio remediation)

Challenges
mitigated

- Treatment of coastal and offshore oil spills and sludge treatments in refineries



PSU

Potassium Humate from Lignite

About the Technology

- **Technology for Extraction of Plant Growth Stimulant (liq. form in 2-4% conc.)**

Sector

- **Farming & forestry**

Stage of Development

- **Commercialised**

USP

- **Soil health rejuvenation, increase of plant yield**

Challenges mitigated

- **Promotes long term health of the soil and helps in carbon sequestration**



HUMIC ACID - PILOT PLANT
Capacity: 3,60,000 Litres/annum

Industry

Bio-Mix

About the Technology

Sector

Stage of Development

USP

Challenges mitigated

- **Microbial Consortium based Agri-Input**
- **Farming & forestry**
- **Scaling Up**
- **Low cost, longer shelf life, survival of microbial formulation in one single product with high cell count**
- **Substitute the chemical fertilizers by introducing major nutrients in soil and helps in carbon sequestration**



R& D institution

Type IV Hydrogen Storage Tank

About the Technology

- Light-weight hydrogen storage composite cylinders of specified capacities of vehicular applications using fully -wrapped carbon fiber reinforced composites

Sector

- Energy

Stage of Development

- Prototype

USP

- Weight of the hydrogen storage cylinder is expected to significantly reduce while increasing vehicle efficiency

Challenges mitigated

- Mitigate storage issues of Hydrogen



R& D institution

Hydrogen Fuel Cell Bus

About the Technology

- Utilizes Hydrogen and Air to generate electricity to power the bus and the only effluent from the bus is water

Sector

- Energy

Stage of Development

- Prototype

USP

- Smart, safe, zero emission, cheapest for >300 km range

Challenges mitigated

- Environmentally friendly mode of transportation



R& D institution

Carbon Capture Under Flue Gas Conditions

About the Technology

- Synthesis process to produce an adsorbent capable of adsorbing more than 3 mM/gram of CO₂ at flue gas conditions

Sector

- Energy

Stage of Development

- Commercialised

USP

- Captured CO₂ could also be converted into value-added industrially important chemicals like methanol, formic acid

Challenges mitigated

- Aligned to SDG on Climate Action and reduces global warming



R& D institution

Biomedical Waste into Soil Additives

About the Technology

- The system can disinfect both liquid and solid biomedical waste and convert the degradable waste into soil additives

Sector

- Pollution & Waste

Stage of Development

- Commercialised

USP

- Handles, disinfect and solidifies biomedical waste with minimal human intervention

Challenges mitigated

- Alternative to incineration that minimize the hazardous emissions



R& D institution

Dimethyl Ether (DME) Technology

About the Technology

- Novel process to manufacture DME from biomass that can be blended with LPG/ diesel

Sector

- Energy

Stage of Development

- Scaling

USP

- Highly active, scalable, selective, cost-effective, stable and water tolerant metal oxide catalyst and clean burning fuel

Challenges mitigated

- Aligned to SDG on Climate Action and reduces global warming

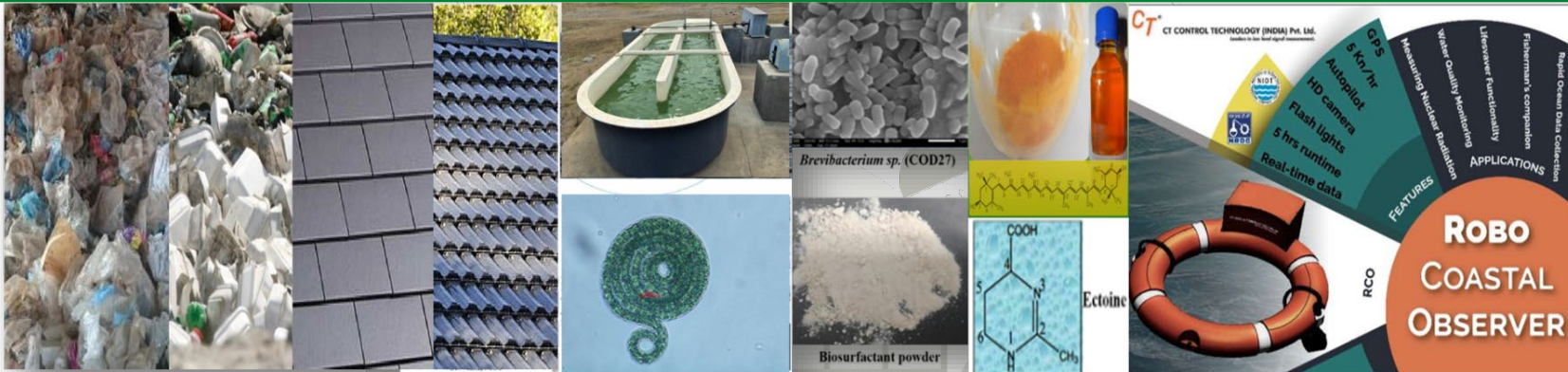




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NRDC- Success Stories of ToT of Green Technologies





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ENGAGEMENT OPPORTUNITIES STRATEGIES FOR MONETISATION OF GREEN TECHNOLOGIES



Gap Analysis in Translating Technologies from Lab to the Market

- Technology Transfer directly from WIPO Green Database to Industry: **A Challenge**
- Technology Transfer Facilitator: **A Missing Link**
- Value Addition Activities Required:
 - **TRL Assessment**
 - **IP Valuation**
 - **Market Surveys**
 - **Draft Project Reports**
 - **Basic Engineering**
 - **Techno-commercial support**





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Translation of green technologies listed in WIPO Green Database

- **Setting-up a network of Technology Transfer Offices (TTO's) for facilitating translation of technologies**

- **Facilitating the TTO's for carrying out:**
 - **Need Identification based on sectoral reforms**
 - **Technology Identification**
 - **Identification of industry partners**
 - **Requirement based development of Clean & Green technologies to address environmental challenges**
 - **IP support**



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Translation of green technologies listed in WIPO Green Database

- **Conduct Capacity Building Programmes in collaboration with WIPO Green**
- **National Co-ordinator for populating WIPO Green database.**
- **PoC of the proposed concept by NRDC**
- **Hub and Spoke model: Replicated world-wide**



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NRDC Efforts in Connecting the dots for Innovation Achievement



NRDC represented India in the recent WIPO Asian Regional Conference in Support of Accelerated Life Sciences Innovation- Skills Development and Capacity Building at Manila, Philippines from 11th – 15th September 2023



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NRDC- The Best TISC for Year 2020 & 2023 in Innovation Translation





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THANK YOU

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