



ICAO

ENVIRONMENT



2023 ICAO STOCKTAKING



SAF-LAB Exhibition



11 to 13 JULY 2023

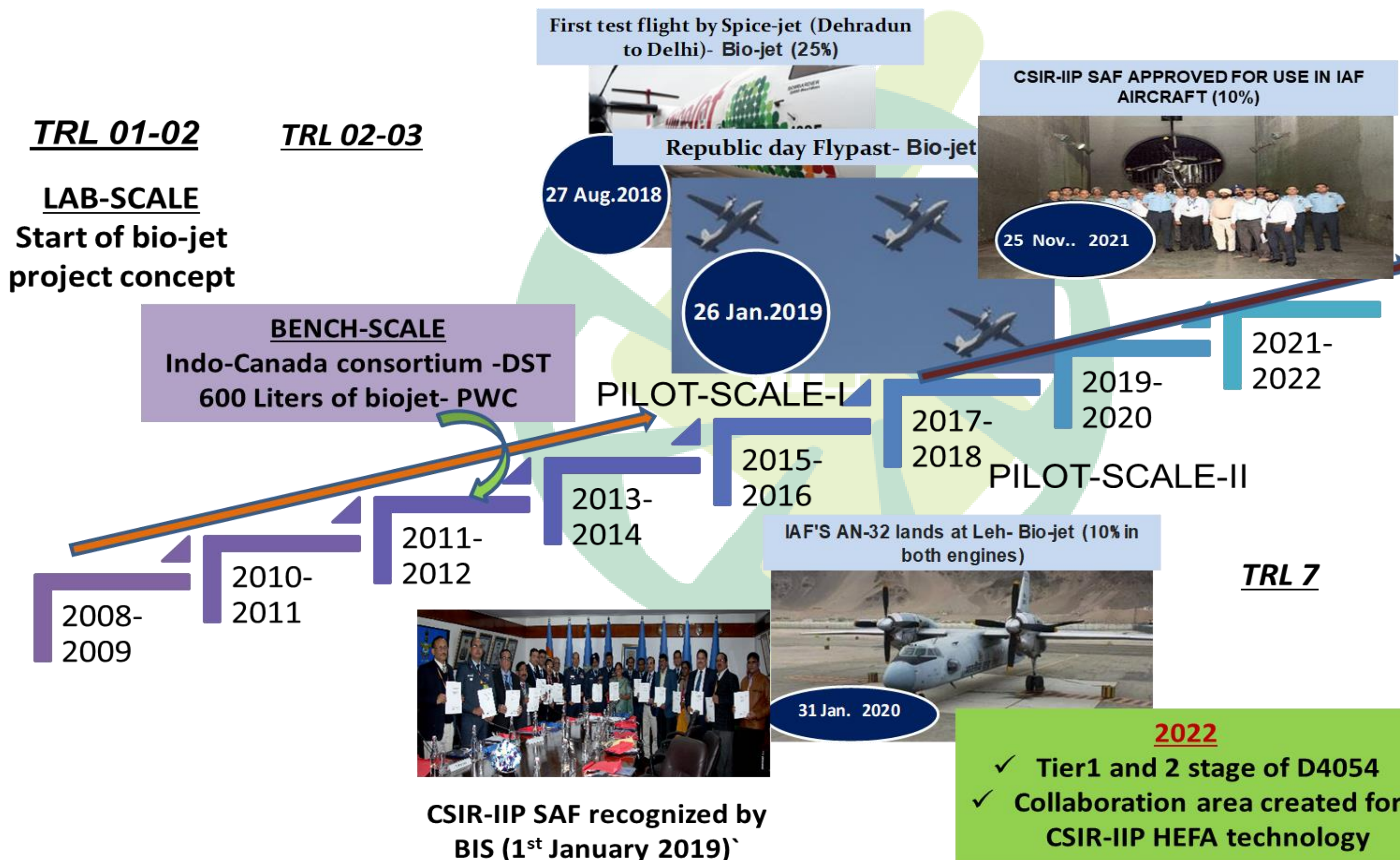
Montréal, ICAO Headquarters



Dr Anil Kumar Sinha
Chief Scientist
CSIR-IIP

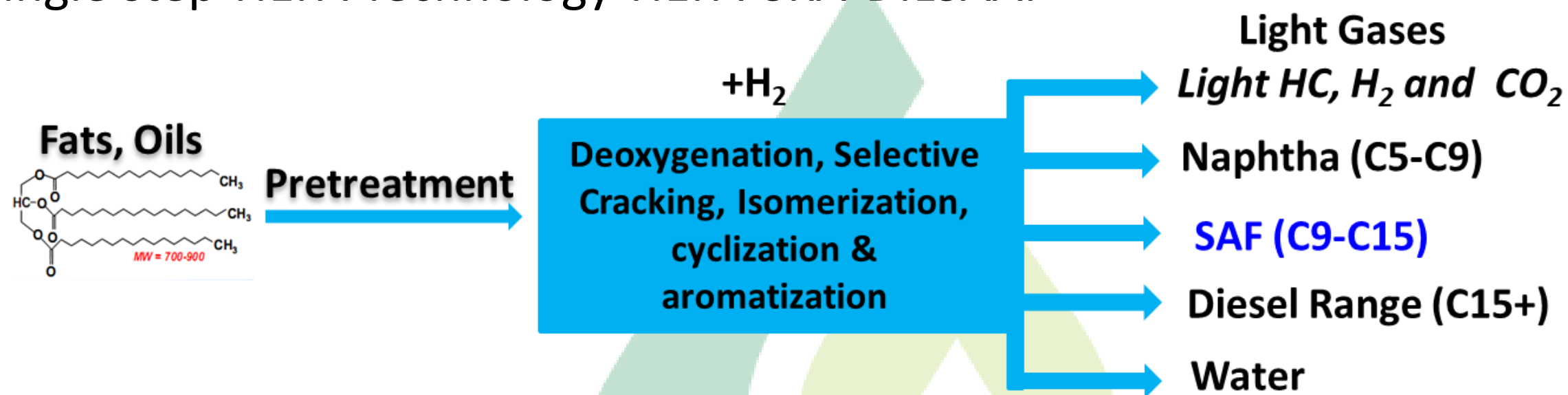
**Single-Reactor HEFA Technology for Drop-
in liquid Sustainable aviation and
Automotive Fuel (DILSAAF™)
HEFA-SKA-AC 644**

DILSAAF™ technology-Technical development



CSIR-IIP process DILSAAF™

CSIR-IIP Single step-HEFA Technology-HEFA-SKA-DILSAAF™



Components (Wt%)	IIP-A	IIP-I	IIP-J	Jet A
Alkyl benzenes	6.3	4.5	5.2	12.8
Di-aromatics	0.5	0.1	0.2	2.3
Cyclo-aromatics	3.0	1.7	2.2	3.2
Total Aromatics	9.8	6.3	7.6	18.3
Iso-Paraffins	56.3	63.0	62.5	28.7
n-Paraffins	22.4	18.8	20.0	18.9
Paraffins	78.7	81.8	82.5	47.6
Mono-cycloparaffins	10.1	10.5	9.1	25.4
Dicycloparaffins	1.4	1.3	0.8	8.5
Cycloparaffins	11.5	11.8	9.9	33.9

Salient features of the CSIR-IIP Technology

- ✓ **Single step** catalytic HEFA process , **Feed flexible**.
- ✓ **Multiple simultaneous reactions in a single reactor**: Composition-wise, CSIR-IIP SAF contains paraffins, iso-paraffins, cycloparaffins and aromatics.
- ✓ A single **patented non-noble-metal catalyst**
- ✓ A general usage authorization for Indian Air Force Aircraft (Provisional Clearance Certificate, subject to OEM concurrence) has been issued
- ✓ A demonstration plant to manufacture ~126 BPD of SAF at a cost of ~36 Million USD, by MRPL-ONGC is expected to be ready in 2025
- ✓ A demonstration plant to manufacture ~80 gallons per day of SAF, by UPL, India is expected to be ready in Dec. 2023

CSIR-IIP also proposes a maximum limit of 10% (wt %) aromatics instead of 0.5% for Annex A2.

Current activities

- ✓ **Construction of demonstration plant at a refinery using DILSAAF CSIR-IIP technology-MRPL-EIL: *Working towards technology deployment***
- ✓ ***Aviation fuel being produced for trial and demonstration on Dornier aircraft (Do228) -IAF***
- ✓ **Working towards ASTM approval and inclusion**
 - *Improving handling procedures and protocols*
 - *Seeking ASTM support and guidance for fast-track approval as a variant of HEFA under Annex A2 with relaxation in aromatics specification, or as a new Annex*
 - *ASTM Work Group for CSIR-IIP fuel created*
- ✓ **Feedstock Supply Chain:**
 - UCO: Aggregator-Refinery agreement
 - New feedstocks: poultry/animal fat etc.
 - Rotation Crop: Carinata (Ethopian Mustard plantation)

Thank You



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