Innovative Carbon Capture through Fecal Sludge Management in the PRC

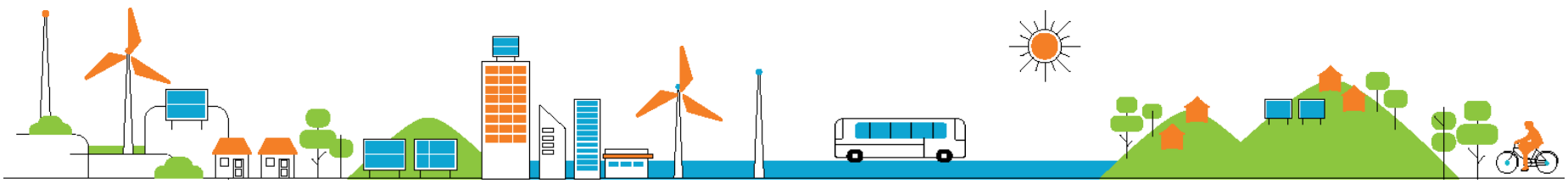
Hubert Jenny, EAPF & PRCM Innovation Unit
hjenny@adb.org

OBJECTIVE

Support Strategies:

- Climate Change (Mitigation & Adaptation)
- Environmental Sustainability (Air, Water, Waste)

⇒Government (INDC & 13TH FYP)
⇒ADB CPS 2016 – 2021 & Strategy 2030



Beijing Capital Region (BCR)

Population ~23 Million
2nd largest city in the World after Shanghai, PRC

Water resources availability (m3/capita/year)

WHO < 500 - BCR < 200

⇒ **Water stressed:**
Northern China: 15%
PRC Water Resources

Today's Situation: Northern China

Deforestation:

⇒ Desertication (27% PRC)

⇒ Sand Storms

⇒ Lack Green Area

⇒ Air Pollution (AQI>100)

⇒ Sand Storms (AQI>800)

⇒ Soil Erosion

Today's Situation: FSM

China Market Assessment:

90% sewerage coverage but major cities still have septic tanks

Sludge Water Content:

Septic Tank > 99% (liquid)

Dewatering: 50 – 80% (solid)

Collection & Disposal:

Landfill / Incineration

Recommendation: The Project !

Create Nursery Trees and Forest in peri-urban areas

⇒Reuse sludge (waste to resources)

⇒Mitigate land erosion and sand storms

⇒Curb air pollution

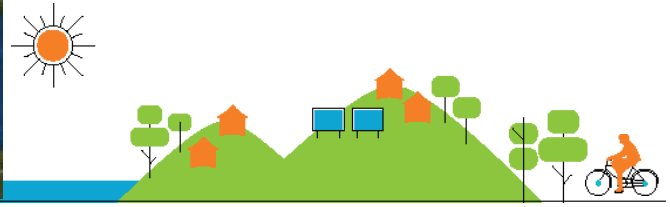
⇒Generate economic development (timber)

Green Wall of China

100 B. Trees (1978)

PRC INDC

Lack of Water!!!



Example: France - LANDES


IMPLANTATION
DE LA FORÊT
LANDAISE
OCÉAN ATLANTIQUE
Soulac
BORDEAUX
Dordogne
Garonne
Nérac
Mont de Marsan
Dax
Adour
Bayonne
PAYS
D'ORTHE

Forest of the LANDES: BEFORE 1855

- Area > 1 million ha (Green < 0.250 million ha)
- Sand & Swamp

LANDES => TODAY Forest 1 Million Ha

Largest Artificial Forest in Western Europe

The Project: How?

2017 – 2018: SFPF (WFPF)

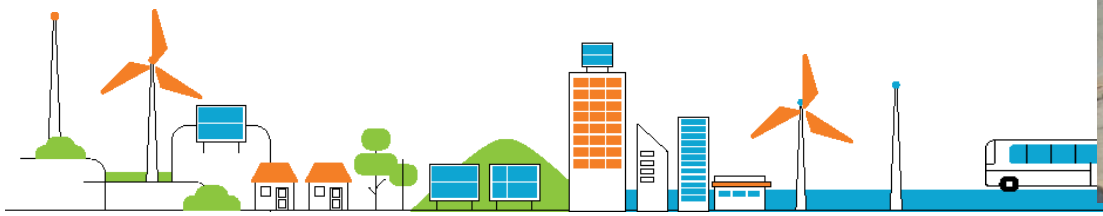
PROOF OF CONCEPT: Key Findings

Fecal sludge = cost effective method

- Watering Trees
- Nutrients (N, P)

With limited treatment:

- Dewatering 15% solids
- Disinfection



The Project: Stakeholders!

State Forestry Administration: National Forests

Huanwei Sanitation Co. Municipal SOE - Operator

Municipal Forest Bureau (2020)

- BCR: 300 Million trees
- Hohhot: 1 Billion trees

Private Nurseries: High value trees - landscaping BMG + Private Developers

The Project: Two Loans

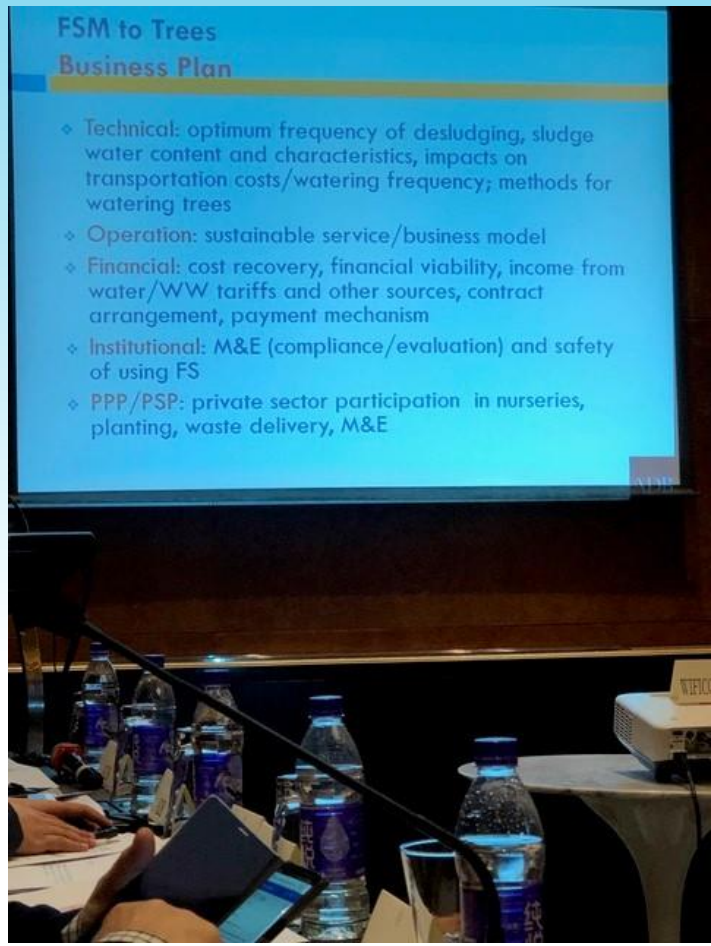
1. PPP/NSO with Huanwei SOE (2020): $50 Million

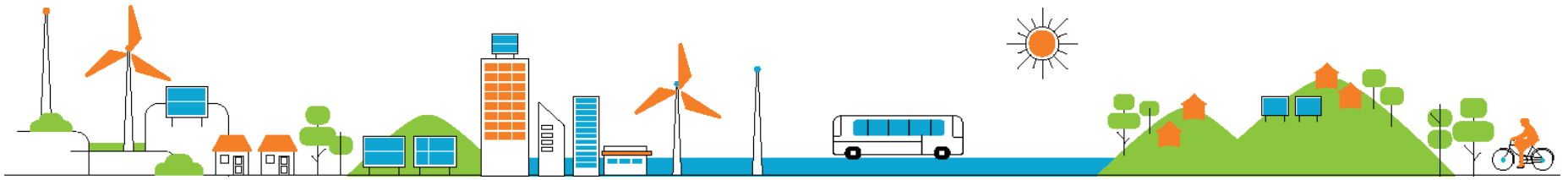
Upgrading Septage Treatment;

Producing Green Sludge

New Electric Trucks:

- Collection
- Mobile dewatering

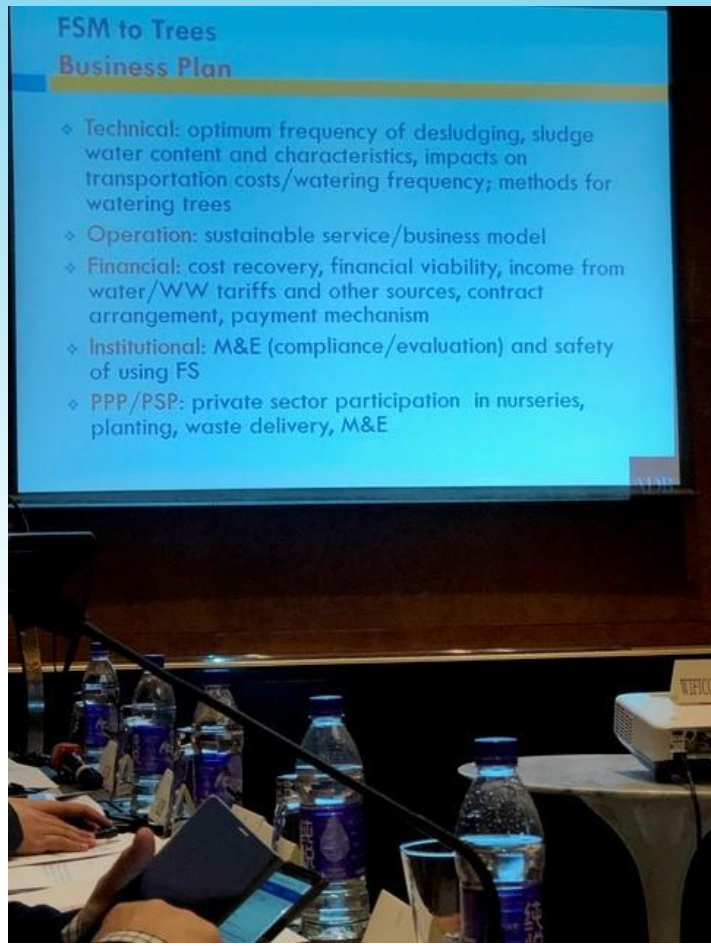


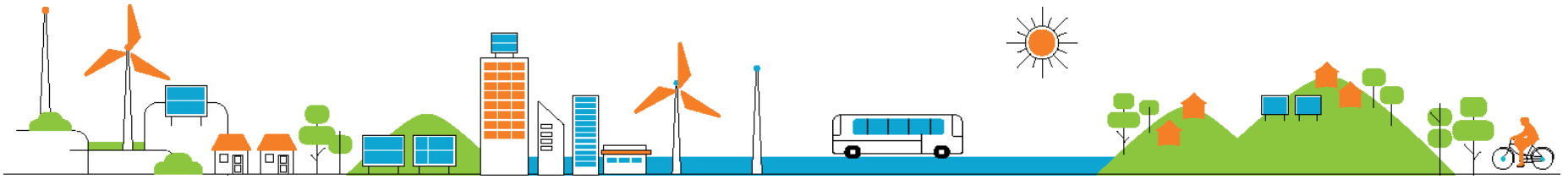


The Project: Two Loans

2. Sovereign Loan with SFA & Local Governments (Beijing; Hohhot, Qingdao, …) (2021/2022) $100 M (RBL/FI/Sector Loan):

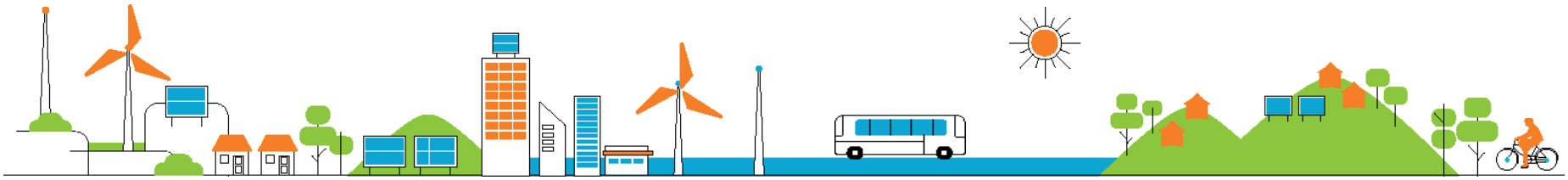
- Trees Planting & FSM
- Including Improvement Sludge Treatment
- Timber Industry





The Project: High Level Technology

- Enhanced/ smart septage sludge treatment
- Disinfection & safe handling
- Tree watering, MERV (safety)
- Test technologies (with BMGF & Pekin University): Mobile dewatering trucks, ‘ingestors’ (grinders), collection and re-use



The Project: Outline Financial

Cost Savings:

- No Fertilizer & No Irrigation (Sludge)

Increased O&M:

- Sludge Treatment &Transportation

Comparison using minimum required water for irrigation	FSM Pilot (200,000 Trees)	Current Methodology
Transportation of sludge to forests	248,760	
Costs for dispersing sludge in forests	264,375	
Costs for additives in primary treatment	5,689	
Transporting/disposing sludge		124,380
Cost of water for irrigation		63,000
Annual cost for fertilizer		2,679,075
Total Annual Costs	**518,824**	**2,866,455**

The Project: Results Climate Change

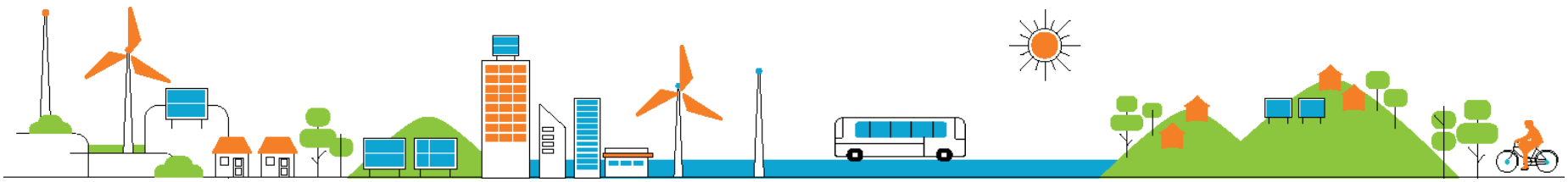
Project => 4 million tCO2eq emission reduction/Year

(i) 70% reduction 2,000 tCO_2eq conventional collection, treatment and disposal fecal sludge;

(ii) 70% reduction 2,000 tCO_2eq from trees' irrigation with existing water resources;

(iii) 3,600 tCO_2eq from offsetting the use of fertilizers; and

(iv) 33,000 tCO_2eq carbon sink through faster trees growth and increased trees' survivability of 30%




Thank you