Catalysing Industrial Transformation for sustainability

Mr. Calvin Chung

Group Director/ Chief Environmental Officer

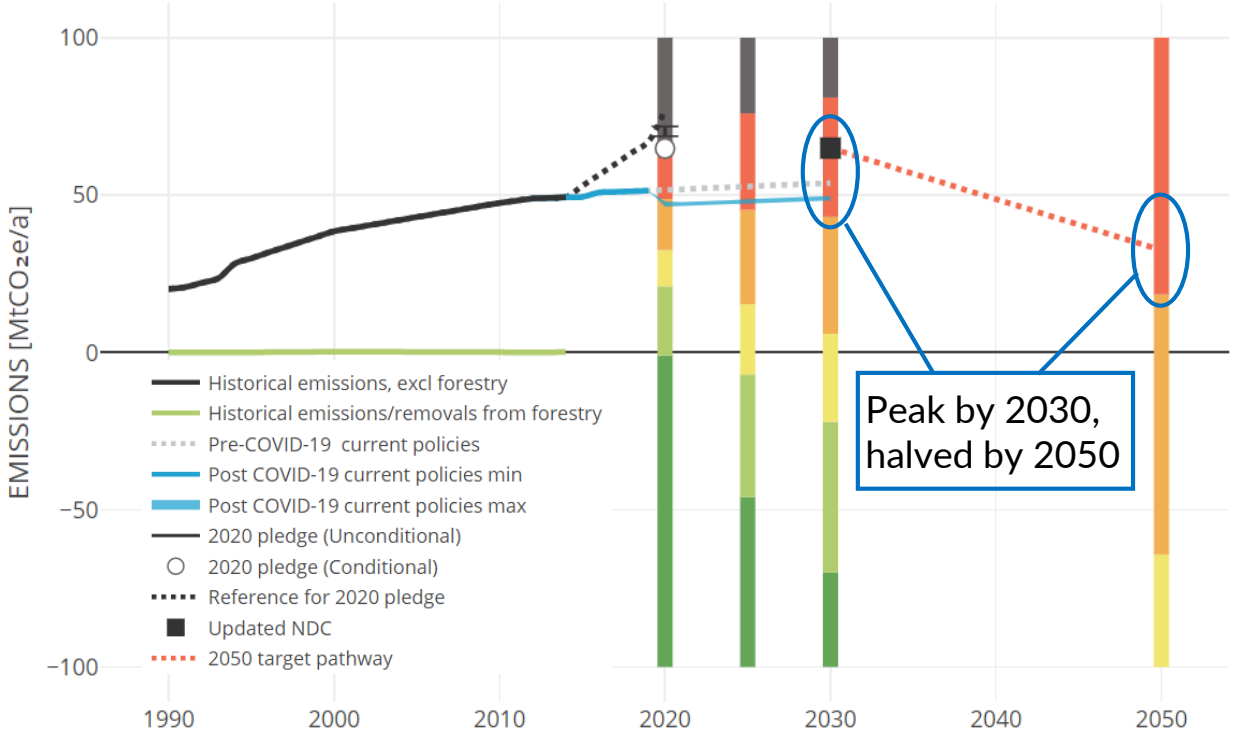
25 May 2021

1. National Challenges and Sustainability Targets

Carbon – the New Constraint for Singapore

- Singapore is no stranger to constraints: land scarce, lack of water. Carbon would be a new addition to the list
- Like Our Water Story – Singapore is embarking on another journey to address the carbon constraint

Singapore carbon emission projection (Climate Action Tracker)



4°C+	Critically Insufficient	<3°C	Insufficient	<1.5°C	Paris Agreement
<4°C	Highly Insufficient	<2°C	Compatible	<<1.5°C	Role Model

- Singapore has signed Paris Agreement and committed to 36% reduction in emission intensity below 2005 by 2030
- Singapore national targets: peak emission of 65 million tons of CO2e by 2030 and to be halved by 2050
- A carbon tax for industrial facilities at $5 SGD/tCo2e was implemented in 2019, to be reviewed in 2023
- A 2GW target by 2030 for solar energy was unveiled in SIEW 2019

Strong National Drive Towards Sustainability – SG Green Plan 2030

- **SG Green Plan** - An overarching sustainability vision for Singapore, a whole-of-nation action plan to realise the vision, and a relatable communication with the public to inspire action
- JTC's ongoing sustainability effort has already been contributing to the SG Green Plan pillars.

SG Green Plan

City in Nature

- One million more trees across island
- Develop programmes for people and wildlife to live in harmony

Energy Reset

- Green 80% of all buildings by 2030
- 60,000 EV charging points nationwide by 2030
- By 2030, solar energy deployed to be five times that of today

Sustainable Living

- Zero waste nation powered by a circular economy
- Turn waste treatment residue into NEWSand for construction

Green Economy

- Create business and job opportunities in green sectors
- Promote homegrown innovation under RIE 2025

Resilient Future

- Engineering study against climate change @ Jurong Island
- Urban heat island effect mitigation
- 30-by-30: produce 30% of nutritional needs by 2030 locally

JTC Sustainability Efforts

Key Initiatives

City in Nature
- Tree Planting at JI
- Increasing estate green cover
- Biophilic Framework for estates design

Energy Reset
- JTC Solar Programme
- JTC green buildings
- Providing 4,300 EV chargers in existing and new development

Sustainable Living
- Jurong Island Circular Economy Study
- R&D on upcycling of local waste into construction materials

Green Economy
- JTC Green Lease
- JI Renewables Open Call
- JTC Open Innovation Challenge

Resilient Future
- Creating waterbody at JI for flood mitigation
- Participating in UHI research group
- Participating in MCCS

Work Streams


Sustainability by Design


Construction Sustainability


Operations Optimizations


Renewable Energy


Industry Transformation

2. JTC Ongoing Sustainability Efforts for the Industrial Sector

JTC's Sustainability Framework and Initiatives

JTC's Sustainability Vision and Targets

JTC' Sustainability Vision

JTC strives to adopt environmental sustainability as a **core principle, value pillar and strategic differentiator** in our industrial estate development and operation with the aim to:

- Mitigate carbon as a business constraint and promote circular economy to address resource scarcity;
- Catalyse the transformation of the industry to be more eco-conscious and future ready;
- Tackle the challenges and seize opportunity to increase corporate credibility and acceptance by the nations, businesses and customers

Targets of Sustainability Efforts

JTC Sustainability Targets

Total Value-chain Carbon Abatement in Target Setting (converging timeline 2030)

Summary of Proposed Targets 30-30-3

Design & Construction | **Operations & Maintenance** | **Customer Engagement**

Development Carbon

Reduce development carbon of new construction projects

Operational Carbon

Reduce operational carbon intensity

Industry's Carbon

Reduce average carbon emission intensity of the industry

Real Estate Life Cycle

Total Carbon

Achieve total CO_2 abatement target

Development Carbon
Manufacture, transport and installation of construction materials

Operational Carbon
Building energy consumption

Industry's Carbon
Tenants' and lessees' economic activity

JTC Solar Program

Form collaborative partnerships to achieve national carbon targets

- Launched **Solar Land & Solar Roof** programme in collaboration with our customers since 2018
- Install solar panel on JTC property roof space and vacant industrial land for solar generation
- Working with solar vendors to continue innovation and advance solar deployment
  - **Terrenus Energy:** development of vertical wind turbines around existing solar farm, usage of mobile substations that allows for quick relocation and crop farming under PV panels
  - **Sembcorp:** test bedding underground rainwater harvesting tank below solar panels

SolarLand @ Jurong Island Seraya Place

- Contribute to national target on solar generation (2GWp) and carbon emission (peak by 2030)
- Aggregate customer roof tops for solar generation and aggregate SME demand for economies of scale
  - **100 MWp** of generation capacity will be attained across JTC's intermittent/vacant land.
  - **147 MWp** of generation will be attained on lessees' roofs
  - **16 MWp** of generation capacity will been attained on the roof of JTC properties. A further **4 MWp** will be added in subsequent projects.

SolarRoof @ Jurong Town Hall

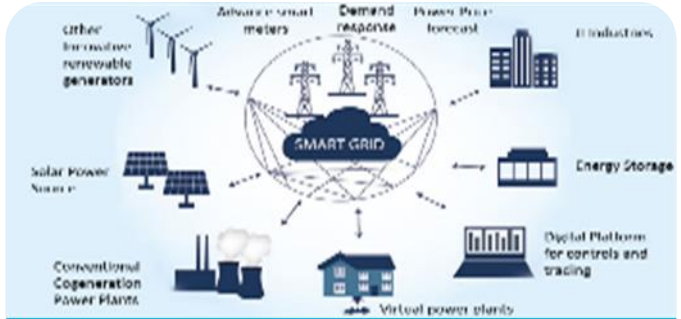
SolarRoof@ Tuas South

Jurong Island Renewables Open Call

Creates new business opportunities, build new capabilities and prepare economy for the future

Conventional Solar & Energy Storage system

- Explore possible locations to solarise, e.g. dead-sea spaces, tank roof tops, piperacks, and even along roadsides
- Lessees will offer space and indicate interest in tapping on JTC's rates for the RFP



Smart Grid Management System (SGMS)

- SGMS will be piloted on JI allowing digitalised energy management
- Infrastructure renewal and replacement is required to "smarten" the grid
- Establish virtual energy trading platform for lessees to buy/sell energy

Innovative Renewables & Low Carbon Tech.

- JTC and EMA will co-fund innovative renewables and low carbon technologies, e.g. solar deployment on tanks, piperacks and tidal generation
- Lessees will indicate Interest partnering with potential solution providers

Jurong Island Circular Economy Study

Create new business opportunity & propel resource circularity for low carbon future

Carry out a comprehensive survey on the current state of Jurong Island in terms of 4 key resources:

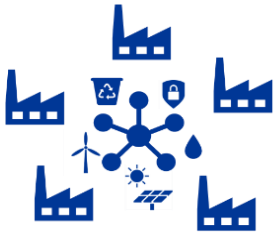
Energy | Water | Emission | Toxic Waste

Conduct **Material Flow Analysis** to identify intervention **"Hotspots"** - areas for change that makes a meaningful impact and improves circularity performance

Potential Outcomes

Promote material circularity, optimise resource utilization, leading to business and environmental gains for companies

Direct 1 to 1 exchange of Resources



Multi-company exchange of Resources

Closing loops by filling gaps. e.g. bring in new Entrees

New business opportunities generated

- **Carbon capture and utilization (CCU)**

Foster a CCU test hub for companies and IHL to test and research on the capabilities of CCU technologies

- **Centralized water facility**

Invest in district level infra for closed loop cooling, reusing of trade effluent, Zero Liquid Discharge technology,

- **Cold energy facilities**

Invest in common infrastructure to harness cold energy for cross industry use and process cooling

- **Waste to resources**

Create new opportunities through 1-on-1 collaboration as well as aggregation of demand exchange

Some of the Participating Agencies and Companies:

PUB Singapore's National Water Agency | National Environment Agency | Chevron | ExxonMobil | PCS | sembcorp | Shell | SLNG Singapore LNG Corporation | SRC | Mitsui Chemicals Group

Greenery and Biodiversity

Create more green spaces and enhance biodiversity to build more conducive industrial estates

Tree planting @ Jurong Island

- Over 17,000 trees planted at Jurong Island
- 53 new species, out of which 37 are native tree species to improve the habitats for native biodiversity

Tree planting @ Seletar Aerospace Park

- Partnered with companies for tree planting a Seletar Aerospace Park (SAP)
- Lessees can contribute physically or monetarily
- Pledged money is used for tree-planting in their estates

Coral Reef Garden @ Sister Island

- Led the construction of underwater structure to restore natural reef habitats
- Reached out the industrial community to encourage corporate ownership on Singapore's natural biodiversity heritage

Jurong Eco-Garden at CleanTech Park @ Jurong Innovation District

- Plan with local context and augment existing natural assets
- Digital planning based on virtual site analysis on hydrology, greenery topography

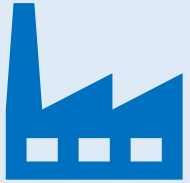
Refurbishment of The Oval @ Seletar Aerospace Park

- The refurbishment of the Oval in Seletar Aerospace Park (SAP), an airplane-theme park for exercise, leisure and dining
- Allow natural growth of ecosystem and biodiversity within the estate

3. Bring Companies along in Sustainability Transformation

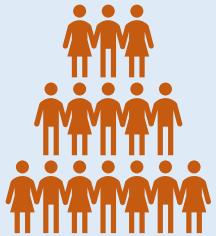
Challenges for the industrial sector

Industrial processes use large amounts of resources (energy and water) for economic activities



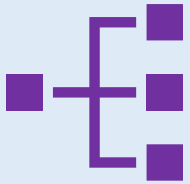
Different expertise, baseline required for different industries

Tenant/lessee data not readily available



High demand for industrial experts expected in the near future

Lack of sustainability expertise worldwide on designing KPI for companies' processes



Tenants' opportunities towards sustainability is decentralized, e.g. obtaining ISO certification/ energy audits / green building certification

New Initiative: Launch *green*DIP

Catalysing Decarbonisation Transformation of the Industry

Industry's Carbon → **Industry Transformation**

- Promote **20%** of JTC customers to participate in *green*DIP and other JTC-sustainability programmes, and reduce average carbon intensity of the participating companies by **10%** by 2030

Objective

***green*DIP (Decarbonising Industry Project)** aims to take a coordinated, targeted and consistent approach to provide a set of tools to :

- help customers in their decarbonisation journey
- promote JTC's sustainability engagement with the customers
- systematically account for companies' CO_2 savings

Action Plan:

1. **Assessment tool: greenCompass**
   Partner with A*Star and TÜV SÜD to develop a set of assessment tools to evaluate companies' sustainability performances in:

Office Operation

Building Construction

Production Processes

2. **"Green Incentive"**
   - Leverage on the assessment tools to qualify customers for a green incentive
   - Explore green financing and funding options
   - Explore blended financing concepts
   - Quantify financial impact of *green*DIP on JTC

Support schemes (work in progress)

Identify and design suitable possible support schemes to drive transformation

Support scheme 1 – "Green Incentive"

- Work with other agencies to utilize current incentives and existing sustainability funds and/or develop a co-share model, for customers who can fulfil a set of sustainability KPIs
- Set different standards for companies with different scales (e.g. by annual revenue)

Support scheme 2 – "Green Lease"

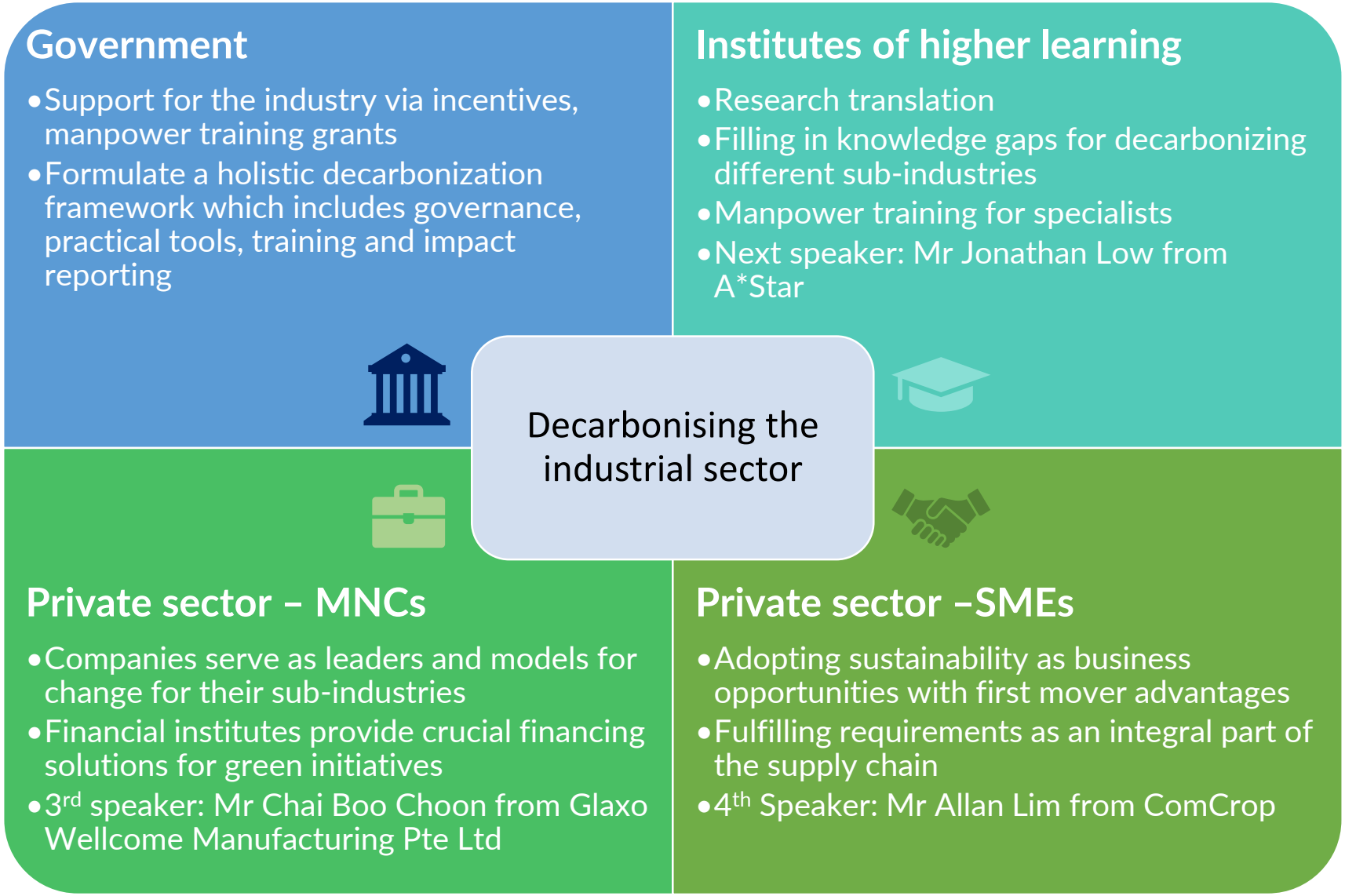
- For New Customers and Existing Customers during lease/tenancy renewal
- Set minimum sustainability standard for tenants to comply with, for construction and operation
- Build "Green Lease" into lease and rental price

Support scheme 3 – "Green Funds" or "Green Financing"

- Provide "Green Fund" to support customers' sustainability initiatives/ projects, including those tying in with greenDIP recommendations for company processes and associated green certifications
- Increasing eligibility to access green loans

Envisioning partnerships

Catalysing Decarbonisation Transformation of the Industry



Sungei Kadut Eco-District

Thank you.