

**NEW GROWTH STRATEGIES TO DRIVE ADVANCED MANUFACTURING  
ACROSS FIVE SECTORS IN SINGAPORE**

1. Mr Heng Swee Keat, Deputy Prime Minister and Coordinating Minister for Economic Policies, launched the refreshed Industry Transformation Maps (ITMs) for five sectors from the Advanced Manufacturing & Trade cluster – Electronics, Precision Engineering, Energy & Chemicals, Aerospace and Logistics – at the opening ceremony of the Industrial Transformation Asia-Pacific 2022 (ITAP) trade event today.
2. The strategies outlined in the five ITMs pave the way towards Singapore’s overall goal to grow manufacturing value-added (VA) by 50 per cent from 2020 to 2030. This will be done by focusing on innovation, embracing sustainability and training talent to seize job opportunities in the backbone of our economy.
3. Manufacturing is the largest component of Singapore’s economy, making up 22 per cent of Singapore’s GDP in 2021. Together, the Electronics (including semiconductor), Precision Engineering, Energy & Chemicals, and Aerospace sectors contributed to 80 per cent of Singapore’s annual manufacturing output of S\$372 billion. The Logistics sector is a critical enabler for goods to flow within Singapore and to the rest of the world.
4. Our established strengths in manufacturing allowed the economy to remain resilient through the pandemic. Manufacturing output grew by 13.2 per cent in 2021, almost twice the pace of overall economic growth that year of 7.6 per cent.
5. The refresh of these ITMs is timely given the dynamic global environment today. Fuelled by rising protectionism and inflationary pressures, more countries are looking to reshore and rebuild manufacturing capabilities closer to home. But despite sharper global competition, Southeast Asia has benefited from a reconfiguration of supply chains for resilience as well as a growing regional market. Manufacturing is also being reshaped by new decarbonisation and sustainability goals as well as the maturation of Industry 4.0 technologies (e.g. Artificial Intelligence, robotics and the Internet of Things or IOT) that have made the production of goods more efficient than ever before.
6. Manufacturing will be smarter, greener and more connected in future. The ITMs reflect Singapore’s 2025 ambition for each of these five sectors:
  - A critical global node for advanced **Electronics** manufacturing and innovation
  - A vibrant ecosystem of digitalised **Precision Engineering** enterprises with a global footprint
  - A sustainable global **Energy & Chemicals** hub that supports green growth
  - A global node for **Aerospace** manufacturing, and maintenance, repair and operations (MRO), with leadership in engine MRO
  - Asia’s leading **Logistics** ecosystem

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*(Please refer to the Annexe for more information on each ITM)*

7. These five ITMs will uplift companies in Singapore through support for research and development, deep tech innovation, extensive digitalisation and environmental sustainability. They also aim to foster partnerships between local small and medium enterprises (SMEs), larger international firms and Institutes of Higher Learning (IHLs) to help SMEs adopt new technologies and build capabilities to capture global business opportunities.
8. In 2021, one in every eight jobs in Singapore – or around 450,400 jobs – were manufacturing jobs. The ITMs will spur the continued creation of good jobs for Singaporeans, and ensure workers have the relevant Industry 4.0, tech and sustainability skills to take on roles in emerging areas such as additive manufacturing and robotics for the Precision Engineering and Aerospace sectors, artificial intelligence for the Electronics sector, digitalisation for the Logistics sector, as well as process engineering for sustainable products in the Energy & Chemicals sector.
9. With the adoption of Industry 4.0 technologies, the local manufacturing workforce has evolved to become a “white-collar” workforce. There are more PMETs (Professional, Managers, Executives and Technicians) than non-PMETS in manufacturing roles. In 2021, 68 per cent of the local (Singapore citizens and PRs) manufacturing workforce worked in PMET roles, a 6 percentage point increase from 2017. Manufacturing labour productivity also grew by 11.9 per cent per year from 2017 to 2021, up from 5.3 per cent per year in the preceding five years.
10. Mr Alvin Tan, Minister of State for Trade and Industry and Culture, Community and Youth, and Future Economy Council (FEC) Advanced Manufacturing and Trade Cluster Co-Chair said: “The Advanced Manufacturing and Trade Cluster Committee actively engaged stakeholders in these sectors to co-develop five invigorating ITMs to take Singapore manufacturing to the next level. The refreshed ITMs support our vision to build a technology-enabled, sustainable and resilient Manufacturing sector for Singapore to remain at the heart of changing global supply chains.”
11. “The Electronics, Precision Engineering, Energy & Chemicals, Aerospace and Logistics ITMs support the transformation of five strategic sectors which are highly productive and well poised for growth. The five ITMs aim to pave the way for more innovative technologies and would create a more interconnected, advanced and sustainable Manufacturing sector,” said Mr Chen Kok Sing, Future Economy Council (FEC) Advanced Manufacturing and Trade Cluster Co-Chair.

### ITM 2025

12. ITMs were first launched between 2016 and 2018 for 23 sectors, to drive industry transformation, support the growth of enterprises and help Singaporeans take up quality jobs and seize opportunities. Each ITM is co-created by the Government, industry stakeholders and unions, and covers areas such as productivity,

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internationalisation, innovation, digitalisation, resilience, sustainability, and jobs and skills.

13. To address the systemic shifts arising from the COVID-19 pandemic, the FEC embarked on ITM 2025 to refresh all 23 ITMs in partnership with companies, schools, trade associations and unions. EDB led the multi-agency effort to refresh the ITMs for the Electronics, Precision Engineering, Energy & Chemicals, Aerospace and Logistics sectors.

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### **About the Singapore Economic Development Board**

The Singapore Economic Development Board (EDB), a government agency under the Ministry of Trade and Industry, is responsible for strategies that enhance Singapore's position as a global centre for business, innovation, and talent. We undertake investment promotion and industry development, and work with international businesses, both foreign and local, by providing information, connection to partners and access to government incentives for their investments. Our mission is to create sustainable economic growth, with vibrant business and good job opportunities for Singapore and Singaporeans.

For more information on EDB, please visit [www.edb.gov.sg](http://www.edb.gov.sg).

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## **Electronics ITM 2025**

### Target

The global electronics sector is projected to grow to US\$3 trillion by 2030, up from US\$2.2 trillion in 2020. Much of this growth will be driven by new megatrends such as Artificial Intelligence (AI), electrification of automotives, and 5G. These application areas will likely require far higher semiconductor content than before; as such, semiconductors stand out as a high-growth subsector.

The refreshed Electronics ITM seeks to ride on the global growth momentum and cement Singapore's position as a key manufacturing and research & development (R&D) hub for higher value-added electronic components.

In 2020, the Electronics sector generated S\$34 billion in VA and employed 64,900 workers. It is the largest contributor to manufacturing output in Singapore. Through the ITM efforts, the industry is expected to achieve growth in VA of 7.6 per cent to S\$50 billion and introduce 5,200 new PMET jobs by 2025.

### Strategies

#### *Anchoring R&D and Manufacturing Capabilities*

EDB will continue to attract manufacturing investments to strengthen Singapore's leadership position in high-value components such as semiconductors, radio-frequency filters, and hard disk media. Over the past year, United Microelectronics Corporation, Siltronic and Soitec are amongst the companies that have announced new manufacturing investments for the global semiconductor industry in Singapore.

Electronics is a R&D intensive sector, where companies will continue to invest heavily in emerging technologies to stay ahead of the competition. To enable new megatrends such as artificial intelligence and electrification, the Government has launched the Future of Microelectronics initiative, which aims to create a globally competitive public-private research ecosystem for Singapore. The Future of Microelectronics initiative will focus on the five technology verticals of Heterogenous Integration, Compound Semiconductors, mmWave and Beyond technologies, Sensors & Actuators and Edge AI. These are verticals where Singapore has existing public research capabilities, and where we are confident in partnering with companies in their R&D journey, to develop novel and transformative technologies.

#### *Strengthening The Local Talent Pipeline*

Electronics is a technology intensive sector that offers good career prospects. The Government will work closely with companies, IHLs, and the Singapore Semiconductor Industry Association (SSIA) to strengthen our talent pipeline to meet manpower needs.

The Government is looking to develop more semiconductor research, engineering and design talent, with the aim of training 1,000 PhDs over the next 10 years. Agencies will work closely with the industry, IHLs and the Ministry of Education in this initiative, to address the growing R&D talent needs of companies in Singapore.

To encourage students to consider a career in the semiconductor industry, the Government will partner with IHLs and the industry to provide more Work-Study training, immersion and internship opportunities. For example, Micron & GlobalFoundries are partnering with the

## FOR IMMEDIATE REPORTING

Institute of Technical Education (ITE) to provide students with opportunities for internship and to attain a SkillsFuture Work-Study Diploma.

EDB and Enterprise Singapore (EnterpriseSG) will also encourage companies to utilise new schemes such as the Accelerated Pathway for Technicians and Assistant Engineers (Manufacturing), which aim to deepen the skillsets of ITE graduates and groom them to take on senior technician and/or associate engineer roles.

To enable mid-career workers to take on good jobs within the Electronics sector, the Government will also promote continuous upskilling and redeployment of mid-career workers, including leveraging tripartite partnerships. The Government will continue to promote the Career Conversion Programme (CCP), as well as the Continuing Education and Training (CET) upskilling programmes. EDB will also continue to work with companies to equip workers with future-ready skillsets. As a case in point, Infineon Technologies plans to train more than 1,000 of its 2,200 employees in Singapore in artificial intelligence competencies by 2023.

### *Transforming Electronics Manufacturing to a Low-Carbon Footprint Sector*

Sustainability is a top priority for electronics companies, many of which have announced ambitious net-zero targets. As the sector grows, reducing the sector's carbon footprint to be compatible with a low-carbon future will be vital to Singapore's resilience as an electronics manufacturing hub of the future.

The Government will partner with manufacturers to reduce the carbon emissions of existing operations by implementing available best-in-class technologies, such as efficient greenhouse gas abatement systems and energy-efficient chilled water systems. The Government will also work with companies to pilot novel emission abatement solutions in new manufacturing facilities. These new solutions could rely on centralising processes with high carbon abatement potential, such as process gas abatement or chilled process water, which need to be incorporated into the design of a facility prior to construction. Lastly, EDB is facilitating discussions between electronics companies and potential importers, with the latter as off-takers under Singapore's long-term green electricity import roadmap.

### *Trade Associations and Chambers as a Key Partner*

The Government will continue to partner with Trade Associations and Chambers (TACs) such as SSIA on the areas of talent development, sustainability and building a strong local ecosystem to transform the industry.

## FOR IMMEDIATE REPORTING

### Precision Engineering ITM 2025

#### Target

The refreshed Precision Engineering (PE) ITM aims to enable the industry to capitalise on digital manufacturing technologies and platforms to innovate and deliver competitive products and services for global markets. It also contains plans to reskill and upskill workers in emerging technologies so they can take on high-value roles in a) new growth sub-sectors such as additive manufacturing, lasers & optics (L&O), robotics, and b) growth sectors such as complex equipment and mature sectors such as precision components. Priority digital and Industry 4.0 skills needed to support these growth areas include 3D modelling, product design and development, preventive maintenance management, big data analytics, as well as programming and coding.

Through these efforts, the industry is expected to achieve a manufacturing VA growth of about 3.2 per cent annually to S\$15.27 billion by 2025. The ITM effort will also create 3,200 new PMET jobs by 2025.

#### Strategies

##### *Partnering with enterprises to digitalise and go global*

The Government will partner with PE enterprises to build capabilities in the design and R&D of innovative, high value-added products and services. A\*STAR's pilot Innovation Factory @ SIMTech, a co-creation space set up with EnterpriseSG's support, will help companies translate their ideas into innovative products, allowing them to move up the value chain and become more competitive.

The Advanced Remanufacturing and Technology Centre (ARTC) will also continue to host the Model Factory initiative, which will help PE enterprises build capabilities to develop digital manufacturing technologies and solutions.

An early success story is Fong's Engineering & Manufacturing, which started as a provider of jigs and fixtures for the electronics and semiconductor industries in 1982. Today, the company has transformed into an established Original Design Manufacturer and contract manufacturer that provides precision components and modular/ full assembly services to the medtech industry. Fong's has kept pace with industry trends and has successfully implemented a lights-out production line with EnterpriseSG's support – featuring technologies like automated guided vehicles and autonomous robots to replace operators as well as fully integrated systems for data transfer and integration from management to shopfloor to enable real-time communications across its production line. This has led to a 30 per cent reduction in machine downtime and 40 per cent reduction in machine idle time, thus increasing Fong's productivity by at least 30 per cent. The company has emphasised human capital development in tandem with its business transformation. It constantly reskills and upskills its employees by working closely with agencies such as Workforce Singapore (WSG) and SkillsFuture Singapore (SSG).

##### *Growing enterprise revenue for PE firms*

The ITM also aims to boost revenue for PE firms within the S\$10 million to S\$500 million revenue range to ensure sustainable growth for the industry. Growth companies that have sector-specific capabilities, especially in key verticals such as semiconductors, medtech and aerospace, can receive dedicated support from EDB and EnterpriseSG to deepen their



## FOR IMMEDIATE REPORTING

capabilities and help them internationalise. Initiatives such as the Global Innovation Alliance by EDB and EnterpriseSG connect Singapore companies to overseas businesses, tech and innovation communities to foster collaboration. In addition, new local entrants with global ambitions, including start-ups and spin-offs in key areas such as Industry 4.0, additive manufacturing, robotics and L&O, will receive help to go global.

EnterpriseSG and the Infocomm Media Development Authority have also launched the PE Industry Digital Plan (PE IDP) in 2021 to help uplift PE SMEs, in partnership with Singapore Precision Engineering & Technology Association (SPETA). The PE IDP consists of a three-stage Digital Roadmap that will help companies to kickstart their digital transformation journey. Through the IDP, SMEs will be able to build core digital capabilities and enhance their operational productivity, allowing them to take on higher value work.

### *Creating good jobs for Singaporeans in growth sectors*

The efforts to transition towards the digital manufacturing paradigm and to grow Singapore's local and foreign PE enterprises are expected to create a new breed of well-paying jobs across roles such as R&D, design, materials, software and manufacturing.

The Government will work with industry partners, IHLs and TACs to upskill and reskill workers to ensure that they have the right skills to take on these new roles. For instance, SSG will onboard multinational corporations and large local enterprises to curate industry-relevant training courses in emerging growth areas such as robotics and Industry 4.0. Companies such as Siemens have already partnered with SSG as a SkillsFuture Queen Bee<sup>1</sup> to provide training to help companies and individuals master skills in emerging growth areas such as additive manufacturing. SkillsFuture Work-Study Programmes such as the Specialist Diploma in Precision Engineering also help to maintain a pipeline of skilled talent for the sector. SPETA and the Institute for Human Resource Professionals (IHRP), with support from EnterpriseSG, have also launched a Manufacturing Employer Handbook, which will guide SMEs to develop and adopt progressive human resource strategies for their business growth needs.

PE enterprises will also receive assistance for redesigning jobs to support their Industry 4.0 transformation. WSG has partnered with the Singapore Business Federation (SBF) to deliver the Industry 4.0 Human Capital Initiative (IHCI), to provide companies with practical and customised guidance to pilot Industry 4.0 technologies, redesign the job roles and engage their workforce for effective and sustainable transformation. PE enterprises may also tap on WSG's CCPs for Advanced Manufacturing Engineer, Assistant Engineer and Operator to hire and reskill existing workers into new or redesigned job roles in the emerging technology areas.

To encourage more young talent to enter and progress in the PE sector, EDB and EnterpriseSG have implemented the Accelerated Pathways for Technicians & Assistant Engineers (Manufacturing) Grant. This will support selected manufacturing companies with progressive human resource practices to hire and train ITE graduates for critical technician and assistant engineer roles, through on-the-job training, structured career progression pathways and competitive salaries.

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<sup>1</sup> Skill Future Queen Bees refer to industry leaders who are frontrunners in championing skills development in organisations, particularly in SMEs. They provide skills advisory and support so organisations can identify and acquire skills needed for business transformation. More details can be found [here](#).

## FOR IMMEDIATE REPORTING

### Energy & Chemicals ITM 2025

#### Target

The refreshed Energy & Chemicals ITM entails a two-pronged strategy to help the sector decarbonise, while seizing opportunities arising from the green economy and the continued demand for chemicals across Asia, driven by urbanisation and the rise of the middle class. It will focus on ramping up innovation capabilities within the private and public sectors.

In 2020, the Energy & Chemicals sector accounted for S\$60.6 billion in manufacturing output and employed approximately 27,000 employees. It is the second largest contributor to manufacturing output in Singapore. Through the ITM efforts, the industry is expected to generate manufacturing VA growth of 3 per cent annually to S\$14.2 billion by 2025.

#### Strategies

##### *Shift to high-value chemicals and specialty chemicals*

Singapore will reduce crude oil processing but maintain a minimum base of refining capacity. This will support the growth of chemicals and also meet some of Singapore's domestic energy needs e.g. for transport fuel. To further capture growth in global chemicals demand, Singapore will anchor the production, supply and distribution of new high-value chemicals crucial to industrial customers. Agencies will also support and enable technology and alternative feedstock to improve the carbon footprint and circularity of chemical processes and products.

Singapore will also focus on innovation and manufacturing capabilities in specialty chemicals and materials, and will prioritise the following chemicals and materials that serve these segments: (1) nutrition & agriculture, (2) hygiene & health, (3) smart materials & mobility and (4) sustainability.

##### *Spearhead energy transition to capture green growth opportunities*

Sustainability is a top area of focus against the backdrop of the global energy transition and Singapore's climate goals<sup>2</sup>.

Agencies will work towards achieving the long-term aspirations outlined in the Sustainable Jurong Island report<sup>3</sup> released in November 2021. The sector's long-term goal is to increase its output of sustainable products<sup>4</sup> by four times from 2019 levels and achieve more than six million tonnes of carbon abatement per annum from low-carbon solutions by 2050. The Government will encourage energy companies to use Singapore as their base in Asia for new low carbon ventures, so they can realise new business opportunities and capture a share of the emerging economy.

##### *Equip Singaporeans for exciting new jobs*

Amidst the energy transition and industry shifts, core Energy & Chemicals skillsets remain relevant for emerging areas in green growth opportunities. For instance, process engineers and technicians continue to be able to apply their skillsets to decarbonise manufacturing plants

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<sup>2</sup> The Singapore Government announced at Budget 2022 that "Singapore will raise our ambition to achieve net-zero emissions by or around mid-century".

<sup>3</sup> Launched in Nov 2021, Sustainable Jurong Island outlines the Government's plans to transform Jurong Island into a sustainable Energy and Chemicals Park that operates sustainably and exports sustainable products globally. Link: <https://www.edb.gov.sg/en/business-insights/market-and-industry-reports/sustainable-jurong-island.html>

<sup>4</sup> Sustainable products significantly reduce environmental impact in their use and/or are manufactured using recycled or renewable materials.



## FOR IMMEDIATE REPORTING

and manufacture sustainable products, while project developers are able to apply their skillsets to carbon capture, utilisation and storage (CCUS) project development.

The Government will equip existing and future generations to take on new roles that require green and digital skills such as sustainable manufacturing, carbon footprint management and digital technology innovation through the following initiatives:

- i. Reskilling through CCPs. For instance, mid-career workers can leverage WSG's CCP for Sustainability Professionals to reskill and acquire sustainability-related skillsets, e.g. carbon management, to complement their Energy & Chemicals roles.
- ii. Regular reviews of existing course offerings from Polytechnics and Autonomous Universities, to ensure continued relevance to the industry's changing needs. This will be achieved through platforms such as the Energy & Chemicals Sector Coordinating Team<sup>5</sup>, as well as through regular direct engagements with our educational institutions.
- iii. Structured internships and SkillsFuture Work-Study programmes such as the Advanced Diploma in Chemical Engineering and Specialist Diploma in Analytical Science for students to gain industry exposure and work experience.
- iv. CET courses such as Green Manufacturing and Planning, and Carbon Management.

Agencies will coordinate marketing of the industry through platforms such as the Chemical Industry Manpower Advisory Committee<sup>6</sup> (CHIMAC), and hold regular engagements with undergraduates. This will help them understand the importance of the Energy & Chemicals sector, the role it plays in sustainability and the energy transition, and the exciting jobs that the sector offers.

### *Growing innovation capabilities with private and public sectors*

Singapore will boost R&D for priority segments in partnership with A\*STAR research institutes and IHLs, including through the Sustainable Polymer Division at A\*STAR's Institute of Sustainability for Chemicals, Energy and Environment.

The ITM targets to establish 20 R&D and innovation centres and the employment of 200 incremental research scientists and engineers from 2021 to 2030, with an increase of S\$173 million in business expenditure on research and development from 2018 to 2030.

The Government will promote R&D in low carbon technologies and sustainable products, through programmes such as the Low-Carbon Energy Research Funding Initiative (LCER FI) and Closing the Resource Loop Programme. Industry-led consortiums, companies, IHLs and research institutes will be involved in this effort. For example, the Singapore Energy Centre (SgEC) is a consortium founded by Nanyang Technological University, National University of Singapore and companies like ExxonMobil to co-develop energy solutions for low carbon transition.

The Government will also actively plan for shared infrastructure to support the innovation ecosystem. For example, to enable companies to rapidly pilot and scale-up new CCU technologies in Singapore, A\*STAR, EDB and JTC are working with ecosystem partners to conceptualise the Carbon Capture and Utilisation Translational Testbed (CCU-TT). There will also be a focus on driving collaborations between local and international partners that can lead to the adoption of new processes in making specialty chemicals and the development of new products, and technology licensing, distributorship or R&D.

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<sup>5</sup> The Energy & Chemicals Sector Coordinating Team is a platform where Institutes of Higher Learning (IHLs) and EDB convene to coordinate curriculum development for all Energy and Chemicals related diplomas.

<sup>6</sup> Singapore Chemical Industry Council and EDB co-chair the Chemical Industry Manpower Advisory Committee which looks into present and future manpower issues related to the industry such as labour supply, training and hiring practices.

## FOR IMMEDIATE REPORTING

### Aerospace ITM 2025

#### Target

Aerospace ITM 2025 aims to cement Singapore's position as a global node for aerospace manufacturing and Maintenance, Repair, and Overhaul (MRO) activities, with leadership in engine MRO. It also aims to pave the way for participation in future aircraft development programmes through emerging areas.

From 2015 to 2019, Singapore's output for aerospace manufacturing and MRO activities had a compound annual growth rate of over 10 per cent. The industry met its ITM 2020 targets in end-2019, when it achieved S\$4.2 billion in VA and created more than 1,000 new jobs.

The strong partnership between companies, unions, industry associations, government agencies and workers has enabled the aerospace industry to weather the pandemic and turn a corner.

Through ITM 2025, Singapore's aerospace industry is expected to achieve S\$4.6 billion in VA by 2025, a 15 per cent increase from the ITM 2020 target. The ITM also aims to restore total employment of our industry to pre-pandemic levels of 22,000 by adding 3,000 jobs.

#### Strategies

*Singapore as a global node for aerospace manufacturing and MRO, with leadership in engine MRO*

Singapore undertakes complex manufacturing of high-value mission-critical parts such as engine components and avionics. We also have nose-to-tail MRO capabilities, including engine MRO for leading companies such as CFM International, GE Aviation, Pratt & Whitney and Rolls-Royce.

The ITM will focus on boosting partnerships with leading aerospace companies to build our capability and capacity for manufacturing and MRO, with a focus on strengthening our leadership position in engine MRO.

#### *Driving transformation through technology*

Under the ITM, agencies will partner with aerospace companies to develop and deploy technologies such as advanced robotics and Industry 4.0 to raise the productivity of our manufacturing and MRO activities. Doing so will also allow the industry to move up the value chain and remain differentiated.

Pratt & Whitney's Singapore Technology Accelerator, for example, will develop MRO technologies focusing on automation, advanced inspection, connected factory and digital twin. The technologies developed here will be deployed across its global MRO network.

JTC's aeroSpace Three, the latest development at Seletar Aerospace Park, will support these efforts by providing companies with "plug & play" smart factory solutions for manufacturing and MRO activities.

#### *Helping SMEs fly high on the global stage*

## FOR IMMEDIATE REPORTING

SMEs support aerospace manufacturing and MRO with services such as parts manufacturing, tooling machining, and specialised coating. EnterpriseSG will support SMEs in developing new capabilities and technological know-how.

Under the ITM, EnterpriseSG also aims to forge more partnerships between SMEs and global aerospace companies. The Smart Manufacturing Joint Lab (SMJL) is a collaboration between A\*STAR, Rolls-Royce and Singapore Aero Engine Services Pte Ltd (SAESL). Through this joint lab, over 100 SMEs have been involved in the co-creation and development of new manufacturing and repair technologies. Such partnerships have allowed SMEs to acquire new capabilities and build their track records, with some being qualified as suppliers to global aerospace companies.

Singapore has a community of start-ups and SMEs in emerging growth areas such as Unmanned Aircraft Systems (UAS), smart MRO, and airport technologies. EnterpriseSG will focus on growing the base of start-ups and SMEs in these emerging areas.

### *Investing in talent*

Aerospace is an attractive employer for Singaporeans. About eight in 10 aerospace jobs are filled by locals. The ITM will focus on investing in the talent pipeline, including reskilling and upskilling our workers to seize opportunities.

This includes digital and Industry 4.0 skills needed to support the growth and transformation of the industry in areas such as additive manufacturing, process improvement, preventive maintenance management, coding, and data analytics.

For example, through WSG's CCP for Aerospace Officer, Aerospace Executive and Aerospace Associate, SIA Engineering Company (SIAEC) redeployed its Line Maintenance Technicians to support base maintenance of freighter aircraft, which enabled the increase in cargo flights during the pandemic. Similarly, ST Engineering tapped on the CCP to redeploy its Licensed Aircraft Engineers to capture new business opportunities in passenger-to-freighter conversions.

Under the ITM, agencies will also strengthen the work-study pathways with companies and our IHLs. One example is the SkillsFuture Work-Study Diploma in Aircraft Engine Maintenance by ITE in partnership with GE Aviation. Under this programme, individuals can work as aircraft engine technicians while pursuing a Diploma at the same time.

To meet the growing demand for Aircraft Technicians and Aircraft Cabin Technicians, SSG launched a new SkillsFuture Career Transition Programme (SCTP) in Aircraft Maintenance for Technician course in collaboration with Singapore Polytechnic and SIAEC, to train and place mid-careerists into the industry. SSG will also expand the SkillsFuture Work-Study Programmes to equip Polytechnic and ITE graduates with relevant skills for the aerospace industry. This includes two new programmes to be rolled out by Singapore Polytechnic for the maintenance of aircraft, engines and components.

### *Gearing up for sustainability and Advanced Air Mobility (AAM)*

A basket of measures, including sustainable aviation fuels (SAFs), electric propulsion and hydrogen-powered aircraft, will be required to support the decarbonisation of the aviation

## FOR IMMEDIATE REPORTING

industry. We will work with like-minded partners to pre-position Singapore for the shifts towards sustainability.

Neste, for example, is expected to add 1 million tonnes per annum of SAF production capacity at its Singapore refinery by Q1 2023 as part of its expansion. When the expansion is completed, Singapore will have the world's largest SAF production capacity. Airbus, Linde, Changi Airport Group (CAG) and Civil Aviation Authority of Singapore (CAAS) have signed a cooperation agreement to study the possibility of transporting, storing, and delivering hydrogen to aircraft at existing and new airports.

AAM is an exciting development that is expected to transform intra-city/inter-city and regional transport of cargo and passengers through "air taxis", or electric vertical take-off and landing aircraft (eVTOLs). Under the ITM, the government is working to develop the enabling infrastructure and regulatory frameworks for AAM technologies. We welcome companies to trial, develop, and commercialise AAM technologies such as eVTOLs here.

For example, agencies are exploring the feasibility of the first piloted eVTOL trials, possibly along the Greater Southern Waterfront. JTC also signed an MOU with Skyports and Volocopter to explore how Seletar Aerospace Park can support the growth of AAM activities, including manufacturing and MRO for eVTOLs.

Being prepared for sustainability and AAM will position Singapore well to participate in future aircraft development programmes that rely on technologies like electrification and autonomous flights. A\*STAR will continue to support companies in their R&D efforts, including engaging in pre-competitive R&D through the Singapore Aerospace Programme, to pre-position themselves for these emerging areas.

### *Emerging stronger through tripartism and partnerships with Industry Associations*

During the pandemic, the Government provided strong support for companies and workers in close partnership with the unions and TACs. The Government will continue to deepen this partnership in the execution of the ITM, to support the recovery in air travel and seize future opportunities.

Mr Ong Hwee Liang, Chairman of NTUC Aerospace & Aviation (A&A) Cluster, said: "We were heartened by the Government's timely response in offering support packages such as Enhanced Job Support Scheme, Enhanced Training Support Package and Career Conversion Programme during the pandemic to preserve jobs and re-skill workers. Unions within the NTUC A&A Cluster will continue to work with the respective companies on talent retention strategies, as well as address workers' concerns amidst business transformation. With global air travel returning towards pre-pandemic levels, aerospace output remaining strong, and more global renowned MRO companies anchoring their presence in Singapore, this will definitely instil confidence in the existing workforce as well as the younger generation that the aerospace industry continues to offer good career opportunities and work prospects."

Mr Wong Yue Jeen, President of the Association of Aerospace Industries (Singapore) (AAIS), said: "Aerospace is experiencing a resurgence and there's a palpable feeling of renewed vigour and enthusiasm in the community. We are glad to have contributed to the Aerospace ITM 2025, which is based on a 'Future of Aerospace' study we undertook with EDB. AAIS and our members look forward to working with partners including EDB to develop a growth path

## **FOR IMMEDIATE REPORTING**

ahead for the industry and cement our position as a regional aerospace and aviation hub, as we head into a full recovery and beyond, sustainably.”

## FOR IMMEDIATE REPORTING

### Logistics ITM 2025

#### Target

The refreshed Logistics ITM seeks to position Singapore as a world-class logistics hub in Asia, where companies build innovative capabilities to keep Singapore and the world's goods moving. The logistics industry is poised to benefit from Asia's growth, with the anticipated rise of consumption and manufacturing in the region. As companies look towards diversifying their existing production bases and supply chains, the emergence of Southeast Asia as a viable alternative location has also placed Singapore in a good position. The refreshed Logistics ITM will focus on transforming the industry through productivity and innovation, and strengthening Singapore's role as a critical node in global supply chains.

In 2020, the Logistics sector generated S\$6.2 billion in VA and employed 85,000 workers. Through the ITM efforts, the industry is expected to achieve an annual VA growth of 2 per cent to S\$6.9 billion and introduce 2,000 new jobs by 2025.

#### Strategies

##### *Attract new investments and transform warehouse operations*

Singapore will work closely with companies to attract and anchor best-in-class (BIC) warehouse operations which are highly automated and provide high value-added services that will set a new benchmark for operations in Singapore. Dubbed the "Red Lion", DB Schenker's next generation warehouse in Singapore is an example. The facility houses state-of-the-art warehouse management systems and adds more than 250 positions in Singapore.

To support the transformation of existing warehouse operations, EDB and EnterpriseSG have set a target to onboard 75 warehouses to the goDCE distribution centre excellence assessment framework by 2025. The goDCE programme by the Centre of Innovation for Supply Chain Management (COI-SCM) at Republic Polytechnic and funded by SSG, provides companies with an assessment of their warehouse processes, identifies gaps and proposes productivity and innovation solutions. It will also provide support to implement the proposed solutions and capability building through project-based training for employees.

##### *Create quality jobs; focus on job redesign*

The attraction of BIC warehouses will create quality jobs as companies anchor more sophisticated roles in operations and innovation. The Logistics Jobs Transformation Map, launched in November 2021, has identified the emerging skills for the industry. The priority skills for the logistics workforce are digital and green skills, such as data interpretation and analysis, artificial intelligence application, applications development, business advisory, as well as sustainability management. These skills will enable our workforce to take on in-demand roles in technology and data analytics, such as Software Engineer and Digital Innovation Lead. The Government will partner with IHLs, training providers, industry players and TACs to support the training of workers in these new roles.

Job redesign will also be important as companies transform their activities. Agencies will work closely with companies to redesign roles, particularly in warehouse operations, freight forwarding and administrative processes. We will continue to support the reskilling of these workers through initiatives such as WSG's CCP for Supply Chain and Logistics Professionals and Coordinators and SSG's SCTP for an Advanced Certificate in Logistics and Supply Chain Management by the Singapore Management University.



## FOR IMMEDIATE REPORTING

### *Digitalise the sector to drive productivity initiatives*

Digitalisation allows logistics companies to gain better visibility of their operations, optimise processes, and invest in automation to increase efficiency. This will allow the broader supply chain to reap full benefits such as increased productivity and cost-savings.

Under the refreshed Logistics ITM, agencies seek to enable 40 per cent of small and micro firms to adopt at least one digital solution by 2025. One way to do this is to work with TACs. For example, the Container Depot and Logistics Association (Singapore) initiated a project to develop a Container Tracking System for the logistics ecosystem, supported by EnterpriseSG. This system enables container haulage companies to track assets such as trailers and prime movers through installing IOT sensors and trackers. Companies can use the system to improve their operational efficiency and use applications such as trailer sharing to optimise resources. Since its launch in 2021, about 30 haulage companies with over 500 vehicles and 1,600 trailers have adopted the solution. It is expected that 160 more companies will adopt the solution over the next two years.

iHub Solutions, a local SME, is an enterprise-level example of how companies improve productivity through digitalisation. It invests about a million dollars yearly in R&D to develop its own in-house capabilities. This includes a proprietary Virtual Logistics System which integrates with e-commerce marketplaces and enterprise resource systems to track, trace, and monitor inventory in real-time. This has enabled iHub to maintain near perfect stock accuracy and to make better inventory decisions, allowing employees to better manage the inbound and outbound flow of goods. iHub has also developed its own digital Cloud Transport System which manages delivery routes and assignments for drivers, through a series of sensors attached to their vehicles. This cost-saving initiative has helped ensure greater fuel efficiency and improve driver safety and productivity.

Agencies will continue to work with stakeholders to help more companies digitalise and improve productivity. These include the COI-SCM, TACs such as the Singapore Logistics Association, Container Depot and Logistics Association (Singapore), Singapore Aircargo Agents Association and the Singapore Transport Association amongst others. Companies interested in adopting digital solutions can work with EnterpriseSG to do so, through support such as the Productivity Solutions Grant.

### *Support companies' internationalisation efforts*

Internationalisation remains a key strategy for enterprise growth. Companies need to build capabilities in new growth areas, to capture opportunities in overseas markets and expand their global presence.

Legend Group is a diversified logistics company which has created a logistics ecosystem to provide an end-to-end solution including trade financing for bulk liquid, dry commodities, perishables, heavy haulage, and oversize cargo. It worked closely with EnterpriseSG on the introduction of in-market partners to explore collaboration opportunities with, and its merger and acquisition efforts to acquire new networks and capabilities. These capabilities have allowed Legend Group to expand and scale its business overseas. Today, it has 15 regional offices across 11 countries and is one of the five largest tank operators in Asia-Pacific. To

## **FOR IMMEDIATE REPORTING**

develop a pipeline for its overseas positions, it has also created local and overseas internships tapping on EnterpriseSG's Global Ready Talent Programme.

The Government will continue to support companies in seizing new opportunities and expanding their global footprint.

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