

香港特別行政區政府

創新及科技局

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INNOVATION AND  
TECHNOLOGY BUREAU

THE GOVERNMENT OF THE HONG KONG  
SPECIAL ADMINISTRATIVE REGION

20/F, West Wing, Central Government Offices,  
2 Tim Mei Avenue, Tamar, Hong Kong

**By email**

20 July 2020

Ms Anita SIT  
Clerk to Finance Committee  
Legislative Council Complex  
1 Legislative Council Road  
Central, Hong Kong

Dear Ms SIT,

**Finance Committee  
Follow-up Action to the Meeting on 15 May 2020**

At the Finance Committee meeting held on 15 May 2020, the Government was requested to provide supplementary information in respect of LC Paper No. FCR(2019-20)40 in relation to the proposal to set up the Re-industrialisation Funding Scheme and inject capital into the Hong Kong Science and Technology Parks Corporation for the developing the Microelectronics Centre. The relevant supplementary information is enclosed herewith for reference.

Yours sincerely,

A handwritten signature in blue ink, appearing to read 'Sandy CHEUNG'.

(Sandy CHEUNG)

*for* Secretary for Innovation and Technology

- c.c. Commissioner for Innovation and Technology  
(Attn.: Ms Eunice CHAN)
- Secretary for Financial Services and the Treasury Bureau  
(Attn.: Ms Candy NIP)

**Finance Committee**  
**Follow-up Action for the meeting on 15 May 2020**

**LC Paper No. FCR(2019-20)40**  
**Supplementary Information**

**Cost Breakdown and Economic Impact Assessment of the Microelectronics Centre (“MEC”)**

Hong Kong Science and Technology Parks Corporation (“HKSTPC”) will modify an old factory in the Yuen Long Industrial Estate into the MEC. With a gross floor area of 36 180 square metres (“sq. m.”) upon modification, the MEC will adopt a flexible design and be equipped with specialised facilities that are normally not available in multi-storey industrial buildings, such as clean rooms, dangerous goods storage and waste treatment facilities, etc. The proposed MEC will also provide shared ancillary facilities such as offices, conference rooms, co-working spaces, and shared laboratories for product quality and reliability testing analysis, etc. The estimated construction cost of the MEC is about \$2 billion. The cost of modification works of the building and associated expenses (including ground investigation, fitting-out, consultancy fee, resident site staff cost, contingency fee, etc.) will be about 65% of the estimated cost (about \$35,000 per sq. m.), and has taken into account the existing conditions of the building structure and facilities, the scope and complexity of the building modification works, etc. The remaining 35% of the estimated cost will be used for setting up specialised facilities such as clean rooms, dangerous goods storage and waste treatment facilities, as well as purchasing and installing the dedicated equipment (such as shared equipment for product quality and reliability testing analysis, etc.) required by the microelectronics industry.

In March 2019, HKSTPC commissioned a consultant to conduct economic impact assessment and sustainability assessment of the proposed MEC. According to the consultant, it is estimated that the project will create about 420 direct job opportunities and generate a value added of over \$600 million annually. A summary of the report<sup>1</sup> is enclosed at **Annex** for reference.

**Cash flow for the Re-industrialisation Funding Scheme (“RFS”) and the basis of estimation**

The indicative cashflow of the RFS as set out in FCR(2019-20)40 and the basis of estimation for 2020-21 to 2024-25 are shown in the table below:

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<sup>1</sup> Only English version is available.

	2020-21	2021-22	2022-23	2023-24	2024-25
Number of projects approved Note 1	15	15	24	24	24
Funding Amount Approved Note 2 (\$M)	225	225	360	360	360
Indicative Cashflow (\$M)	30	112.5	225	307.5	360

Note 1: On the assumption that the RFS would be launched in the first half of 2020.

Note 2: On the assumption that around one fourth of projects would be completed within one year and the rest are two-year projects. Each project is approved the maximum amount of funding of \$15 million. Grants will be disbursed on a reimbursement basis upon the Government's acceptance of the progress/final report and audited accounts submitted by the enterprise.

### **Design and production of CuMask+™**

Since late January this year, COVID-19 has started to spread rapidly. The Innovation and Technology Bureau ("ITB") has been contacting various suppliers of reusable masks between February and April, with a view to assessing the feasibility of procuring reusable masks. However, most reverted that they had either stopped production, did not have enough stock, were unable to export materials due to export control or unable to provide testing certification, etc.

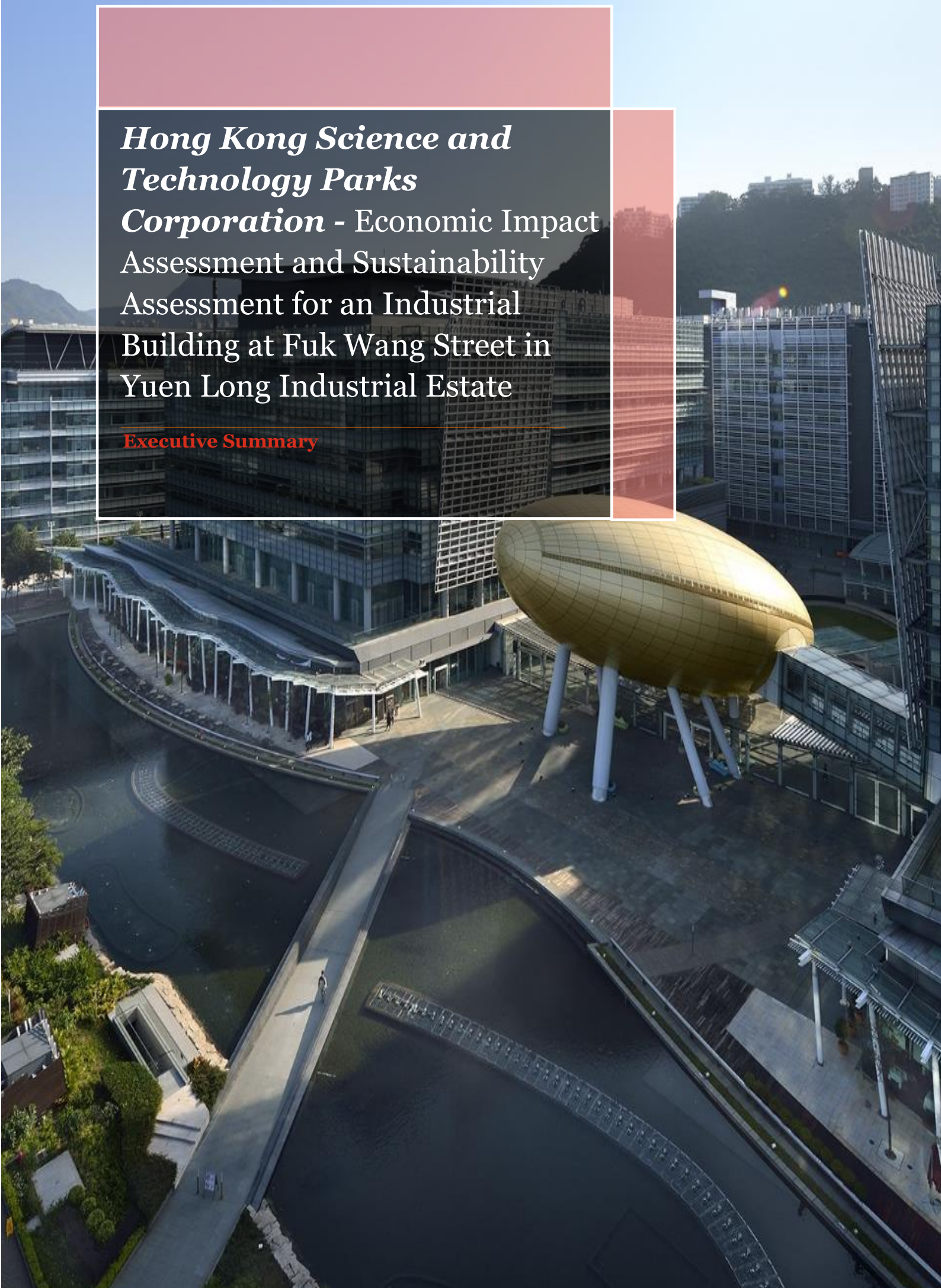
ITB reviewed the reusable mask developed by the Hong Kong Research Institute of Textiles and Apparel ("HKRITA") earlier, and considered that there were testing certifications proving its compliance with relevant international standards. However, the supply of raw materials was extremely unstable at that time. Therefore, during the period between February and April, the Innovation and Technology Commission commissioned HKRITA to co-ordinate the production of a certain amount of masks, only after each time the latter had secured the raw materials and estimated the corresponding number of masks it could produce.

During the process, we have reported the progress regularly in internal meetings of the Government, in which relevant bureaux and departments were also present.

Innovation and Technology Bureau  
Innovation and Technology Commission  
July 2020

***Hong Kong Science and  
Technology Parks  
Corporation - Economic Impact  
Assessment and Sustainability  
Assessment for an Industrial  
Building at Fuk Wang Street in  
Yuen Long Industrial Estate***

**Executive Summary**



**Important Message**

Important message to any person not authorized to have access to this report.

Any person who is not an addressee of this report is not authorized to have access to this report.

Our work was performed in accordance with the engagement letter dated 18 February 2019 with Hong Kong Science and Technology Parks Corporation (HKSTPC) and is subject to the terms included therein. This Executive Summary summarises the findings in relation to Economic Impact Assessment for the MEC dated 29 November 2020. This Executive Summary is intended solely for the members of the Hong Kong Legislative Council. PwC accepts no liability to any third parties.

## *Introduction*

PricewaterhouseCoopers Limited (“PwC”, “We” or “The Consultants”) were commissioned by the Hong Kong Science and Technology Parks Corporation (HKSTPC, the Client), **to undertake an Economic Impact Assessment (EIA) for a Microelectronics Centre (“MEC”) at Fuk Wang Street in Yuen Long Industrial Estate (YLIE) (“The Study”)**. The Study commenced in March 2019. This paper provides an Executive Summary of such Economic Impact Assessment. For more detailed information, please refer to the full report for the “Economic Impact Assessment and Sustainability Assessment for an Industrial Building at Fuk Wang Street in Yuen Long Industrial Estate”.

## *The Policy Context*

### *Re-Industrialisation*

Manufacturing is currently playing a relatively small role in the Hong Kong economy, accounting for 1.7% of its total GDP in 2017. In the past 30 years, Hong Kong has undergone a significant shift in its economic structure, resulting in the majority of the manufacturing activities migrating to the Pearl River Delta (PRD). Currently, Hong Kong mainly plays a role in the management, sale promotion and administration of the manufacturing facilities located in the Greater Bay Area (GBA).

Hong Kong’s strategic location, highly reputable universities, supportive Government policies and ease of trade allows it to serve as an innovation hub for the Greater Bay Area and Mainland China more generally. Its market-focused economy and stringent intellectual property protection laws attract businesses from around the World, ranging from international market leading firms to startups.

Industry 4.0 promotes the concept of "smart factories", with the objective of promoting labour productivity; enabling countries with relatively high costs to be competitive in the Global market, especially **to produce high-value goods at low volumes. This could be suitable for Hong Kong as it provides an opportunity to engage in the re-industrialisation process to support the diversification of the Hong Kong economy.**

HKSTPC has a role in facilitating re-Industrialisation in support to the Re-Industrialisation policy of HKSARG by creating a supportive environment; providing modern manufacturing premises with support services and effectively promoting the buildup of a new and competitive manufacturing sector, based on the application of Industry 4.0 objectives.

HKSTPC plans to construct and manage specialised industrial buildings to support science, innovation, and technology industries that could bring wider benefits to Hong Kong. Following the implementation of IE 2.0 Pilot Projects (i.e. Advanced Manufacturing Centre (AMC) & Precision Manufacturing Centre (PMC)), demand in Hong Kong has been catalysed, requiring more infrastructure and facilities to accommodate new manufacturing operations and upgrading existing undertakings.

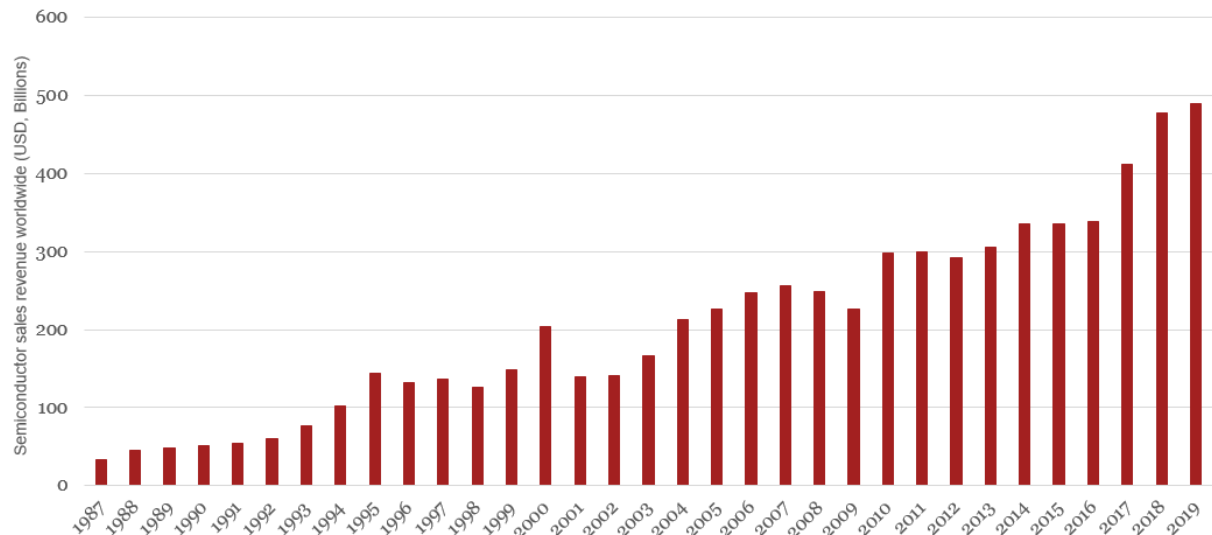
## **Why “semiconductor”?**

Based on the market review and consultations conducted by HKSTPC and PwC, it is noted that **“Semiconductors” (or so called “microchips”) are considered to be one of the high-potential high-tech manufacturing industries to be accommodated in Hong Kong.**

Microchips are utilized by and incorporated into most technology products, from powering AI technology to running the motherboard of a laptop.

In 2018, the **global semiconductor market reached over US\$ 470 billion, representing a ~16% growth from the previous year**, and is expected to continue to grow. East Asia including Japan, Mainland China, South-Korea, Singapore, and Taiwan dominate in terms of production and the export of microelectronic devices and components.

**Figure 1: Semiconductor sales revenue Worldwide from 1987 to 2019 (USD, bn)**



Source: Statista (2019)

Within consumers of semiconductors worldwide, **China composes over half of the Global demand.** However, domestic producers only meet ~30% of the country’s demand. The Chinese Government’s initiative aims to stimulate production activity and help domestic producers meet ~40% demand by 2020 and ~80% demand by 2030. This will create further demand for microchips and other microelectronics to be incorporated into Chinese made semiconductors, and Hong Kong is well placed to capture this growth and benefit.

## ***The Opportunity for Hong Kong***

With a high density of world-class universities, especially with HKUST as one of the leading microelectronics research centres, Hong Kong has a strong supply of talent to develop and deploy in the microelectronics industry. However, many Hong Kong university students move to other economies such as Mainland China and Taiwan after graduation, primarily due to the lack of relevant local work opportunities.

As such, the “Re-industrialization” Policy, initiated and supported by the Government, has successfully attracted some market leading firms to relocate and expand in Hong Kong including IoT, AI, biotech, and robotics. **With strong ongoing Government and local support on the R&D and robust Intellectual Property protection, Hong Kong is considered to be well equipped to support microelectronics market.**

## ***Supply and Demand for industrial floor area in Hong Kong***

Over the past 40 years, Hong Kong has gradually transformed itself from a manufacturing-based economy to a leading financial centre. This economic evolution has been mirrored by new supply in the commercial facilities in urban area, with total office stock increasing by 6.3 times between 1976 to 2016, compared to growth of just 1.8 times industrial space. According to the 2018 Hong Kong Property Review, there was 16.5 million sq.m of industrial floor space at the end of 2017. **Most of the flatted factories are old buildings, which were built 20 – 30 years ago, with low ceilings, inadequate lifts and loading areas and are generally not suitable for modern manufacturing.**

In addition, the majority of vacant industrial units available are less than 10,000 sq.ft. As such, **the proportion of this vacant units, that are appropriate for advanced and micro-electronic manufacturing, is low.**

According to the “Consolidated Land Requirements and Supply Analysis” on Hong Kong 2030+, the shortage for industrial buildings will be about 5.0 million sq.m in the long term (up to 2041). As such, **the Consultants consider that industrial buildings are unlikely to provide sufficient capacity for microelectronics manufacturing in the future.**

## ***Rationale for developing MEC***

Following implementation of IE 2.0 Pilot Project AMC, HKSTPC has received positive market response. As such, there is demonstrated demand for the facilities in Hong Kong to accommodate new and advanced manufacturing operation, especially for the microelectronic manufacturing uses. It is, however, noted that AMC cannot serve the purpose of microelectronic manufacturing use due to the need for specialised facilities in the factory. This provides justification for the development of the proposed MEC in Hong Kong. The major special features of microelectronic manufacturing are summarized below :

- **Special Gas Storage**: “Code of Practice for the Storage and Use of Special Gases in the Micro-electronics Industry” states that internal storage or external storage of the special gas needs to be located on ground floor. The special gases are required to pipe directly from the storage to the machines. The storage should be located next to the factory. Therefore none of the current spaces, including AMC, can provide such direct piping special gas storage on the ground floor.



- Waste Management: Proper waste treatment is required before discharging. The waste treatment plant in microelectronics factory must be specially designed to comply with all the relevant regulations in Hong Kong.
- High Demand of Electricity Power: The demand of electricity power for advanced manufacturing is high. Currently, the electricity in the current supply of industrial space is only able to support office and landlord electrical loading such AC system.
- Structural Consideration: The development of advanced manufacturing requires additional underground works and includes the fitting of new fireman's lift, additional manholes, underground tank if necessary and strengthening of existing footing for additional loading capacity. Additional structure works may be needed to enhance the anti-vibration capability of the building in order to host high-precision equipment.”

HKSTPC is considering to convert the industrial building at Fuk Wang Street for MEC to foster advanced manufacturing production in Hong Kong with a total construction cost of about HK\$ 2.0 billion. The details of the project are summarized below:

- Converting a two-story industrial building at Fuk Wang Street in Yuen Long Industrial Building offering a total Gross Floor Area (GFA) of 36,180 sq.m. The target is to complete construction works by 2021.
- 3 distinct areas are included in the MEC: 1) Office (covering Process Development), 2) Manufacturing, 3) Communal Supporting Facilities; and
- Quality control and reliability lab facility will be provided by HKSTPC to support the operation of tenants.

Based on the current and future shortage of industrial buildings and the uniqueness of facilities contained in MEC, and relatively modern capacity of the project, a 95% occupancy rate<sup>1</sup> is assumed when the project is fully occupied.

## ***Economic Impact Assessment***

### ***Assessment Methodology***

Theoretically, economic impacts in an EIA study will be assessed at three levels – 1) the direct, 2) indirect and 3) induced impacts.

- **Direct impacts** arise through i) **the operation of tenants at the proposed building** (i.e. economic activities of the tenants at the proposed building) and ii) **operation of the proposed building per se (i.e. the management and operation of MEC by HKSTPC)**;

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<sup>1</sup> A 5% natural vacancy rate is assumed to reflect the proposed project turnover with tenants for moving in and out.

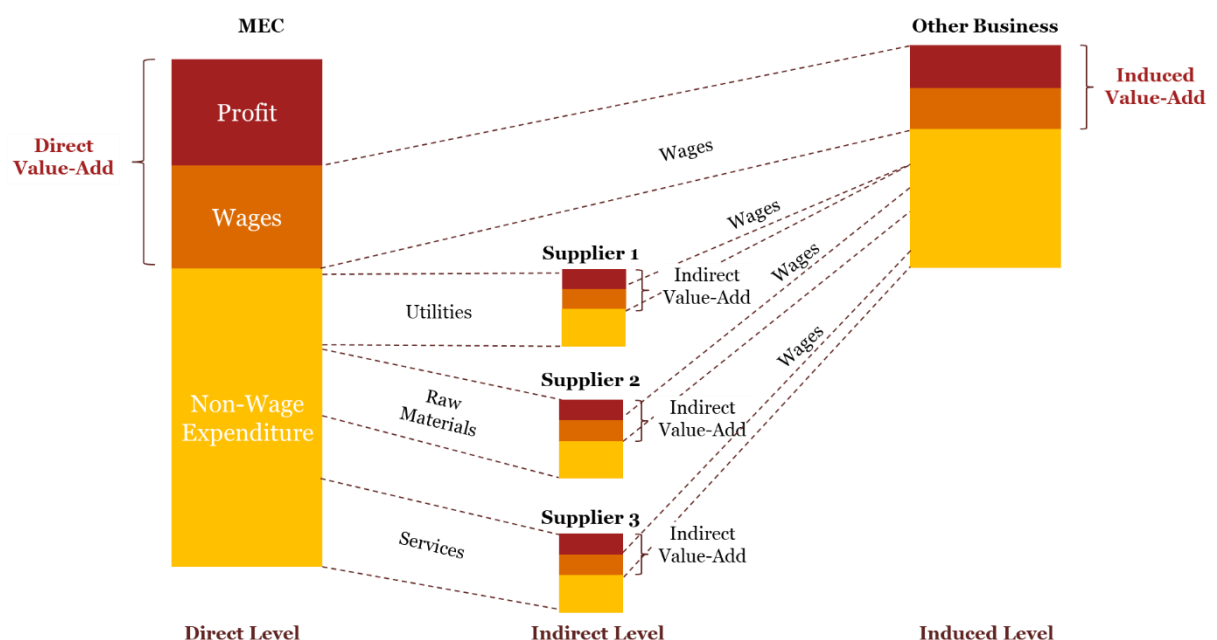
- **Indirect impacts** arise from the expenditure of the operation of such tenants / HKSTPC on goods and services throughout the supply chain in the Hong Kong economy. Apart from wages paid to the employees of tenants / HKSTPC, there are also non-wage expenditures which are for utilities, professional services, etc. This non-wage expenditure supports the revenue of other companies in Hong Kong, supporting further value added and employment in other businesses; and
- **Induced impacts** arising from the spending of employees and beneficiaries (throughout the supply chain) on other goods and services in Hong Kong. For instance, the tenants / HKSTPC pay salaries to their employees and then these employees spend their income on goods and services, further promoting spending and job creation.

Practically, the indirect and induced impacts can be estimated via indirect and induced multipliers.

Impacts are quantified using TWO conventions:

- Value-added impacts (or “GDP”): These being the monetary economic contribution that the development will deliver to Hong Kong through **profits and salaries** being supported that would otherwise not have existed. All value added figures are presented in 2018 prices; and
- Full Time Equivalent (FTE) jobs.

**Figure 2: Relationship between direct, indirect and induced value-added**



Source: PwC analysis

### Major assumptions

#### *Employment*

Direct employment refers to the number of jobs created directly by 1) the companies who are located at the proposed MEC and 2) the HKSTPC’s operation of MEC per se.

### Item 1 – Companies who are located at the proposed MEC

According to the consultation with the potential tenants, it is estimated that, based on the current floor area with the **occupancy rate of 95%, some 413 jobs will be generated** at MEC for some 20 hours per day (2.5 to 3 shifts per day).

Since the manufacturing activities at MEC should relate to larger factories with fully automated manufacturing using robotics, the overall worker density of MEC (i.e. some 150 sq.m./worker<sup>2</sup>) should be lower than that for Industrial Estates in Hong Kong (i.e. around 75 sq.m./worker<sup>3</sup>). As such, the Consultants consider that the current assumption (i.e. 413 jobs to be created) is conservative<sup>4</sup> and within a reasonable range.

### Item 2 – HKSTPC's operation of MEC

As discussed with HKSTPC, **3 FTE employment positions** will be hired directly by the Corporation to operate, manage and promote the proposed MEC, regardless of the occupancy rates.

#### *Direct Value added per person*

Value added is an important measure of economic impact, showing the value added generated by employment (i.e. profit and salary).

### Item 1 – companies who are located at the proposed MEC

The market survey conducted in this EIA Study shows the direct value added per person for the manufacturing activities at the proposed MEC is around HK\$840,000 at 2018 prices. As compared to the annual value added per person for the Manufacturing sector of about HK\$ 400,000, the assumed direct value added per person for MEC is higher, mainly attributable to a higher automation production process adopted by the potential tenants at the proposed MEC as compared with the current manufacturing industries.

Given that the C&SD's manufacturing statistics may not reflect the type of economic activity to be undertaken at the MEC, a number of overseas science parks / industrial estates were also reviewed in order to assess the reasonableness of current value-added assumption.

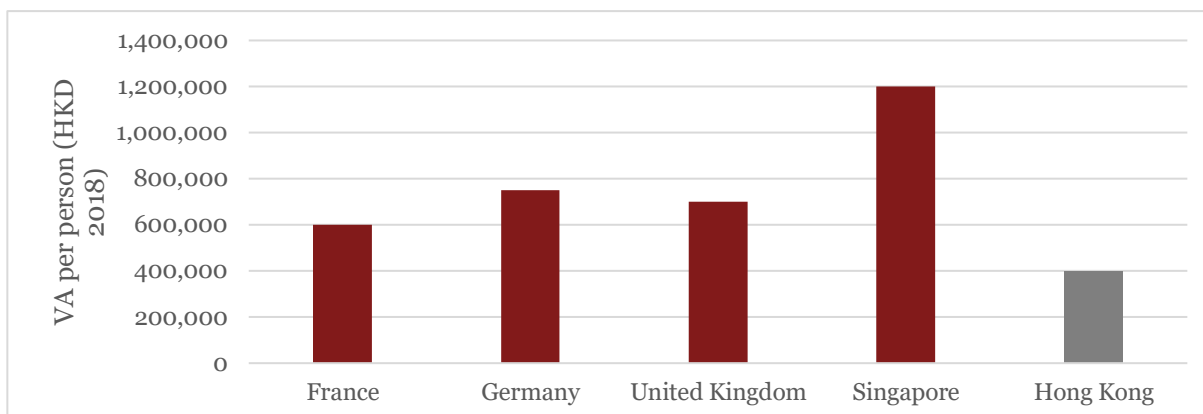
We have also benchmarked the figure on value-added per person with a number of overseas science parks / Industrial estates studies. The figures of value-added per person vary greatly among different advanced countries, with the highest figure in Singapore (overall HK\$ 1 million per person), and the lowest in France (lower bound estimate of HK\$ 600,000 per person). As such, we consider that the value-added per person figure of HK\$ 840,000 in this Study falls into the range of the figures found in the international studies.

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<sup>2</sup> Weighted average of the worker density for MEC is estimated at 150 sq.m. per worker based on distribution of staffs working at MEC by 1) office admin, and sale and process development (40 sq.m. per worker) and 2) manufacturing (290 sq.m. per worker)

<sup>3</sup> Based on Hong Kong Planning Standards and Guidelines (HKPSG)

<sup>4</sup> Theoretically, a higher number of worker density will generate less number of jobs

**Figure 3: Overseas manufacturing VA per person (at 2018 prices)**

Source: PwC based on the VA figures from C&SD and the statistic departments of advanced economies as shown above

## Item 2 – HKSTPC’s operation of MEC

HKSTPC expects that the direct value added per person of its staff is around HK\$ 800,000 (at 2018 prices)<sup>5</sup>.

### *Indirect and induced multiplier*

#### Item 1 – companies which will be located at the proposed MEC

Since the proposed MEC is unique in Hong Kong, the generic Hong Kong manufacturing indirect multipliers should not be applicable to the proposed MEC project.

In light of the above, the Consultants make reference to the relevant indirect value added multipliers of the advanced economies. An indirect value-added multiplier of some 0.2 is assumed by taking the average of THREE advanced economies’ multipliers as mentioned below<sup>6</sup>.

**Table 1: The overseas relevant value added indirect multipliers (as compared to per revenue generated)**

	<b>Indirect VA</b>
Singapore Electrical Manufacturing	0.17
UK Electrical Manufacturing	0.25
US Electrical Manufacturing	0.25
<b>Average</b>	<b>0.20</b>

Source: OECD input output table 2015

The number of indirect employments is calculated by dividing indirect value added generated by the Hong Kong average value-added per person of HK\$ 730,000.

<sup>5</sup> Assuming zero profit generated by MEC to HKSTPC

<sup>6</sup> Based on the consultation, the potential tenants expect that the manufacturing activities at MEC would generate a total revenue of some HK\$ 750 to 800 million (at 2018 prices) per annum to the operators once the project is fully occupied (at 95%). The indirect VA is estimated by multiplying 0.20 by HK\$ 775 million.

## Item 2 – HKSTPC’s operation of MEC

Apart from the three staff directly hired by the Corporation, most of the management and operation roles of the MEC will be outsourced, including property management, quality control and reliability lab, and provision of DG gas – which accounts for about 40% of total operational revenues generated by MEC to HKSTPC (or some HK\$ 45 million per annum at 2018 prices). The indirect value-added and Employment multiplier coefficients for such outsourcing business are assumed to be 0.8 (as compared to total revenue) and 1.7 (jobs per HK\$ million revenue) respectively based on the relevant sectors in Hong Kong and overseas<sup>7</sup>.

By making reference to the induced multipliers adopted in the relevant HKSTP economic impact assessments, induced impact is approximately equal to 12% of direct and indirect impact. The number of induced employments is calculated by dividing induced value added generated by the Hong Kong average VA per person of HK\$ 730,000.

## ***Assessment of the economic impacts of MEC***

Tables below shows the potential economic impacts arising from MEC:

- The total annual economic contribution of MEC to the Hong Kong economy (including direct, indirect and induced) is expected to be some HK\$606 million once the project is fully occupied<sup>8</sup>
- Total employment at the project (including direct, indirect and induced) is expected to be 795 jobs once the MEC is fully occupied
- Over 90% of total value-added would be generated by the tenants operating at MEC, while the operation of MEC per se only account for less than 10%.

**Table 2: Projected value added of the MEC as a whole once the project is fully occupied at 95% (\$ million, at 2018 prices)**

	<b>Value-added (“GDP”)</b>
Direct	348
Indirect	193
Induced	65
<u>Total</u>	<u>606</u>

Source: PwC Analysis

<sup>7</sup> The non-wage expenditure supports the revenue of other companies in Hong Kong. So the indirect VA and employment impact for Item 2 are estimated by multiplying HK\$ 45 million by 0.8 and 1.7 respectively.

<sup>8</sup> Assuming the occupancy rate of 95%

**Table 3: Projected employment (FTE) of the MEC a whole once the project is fully occupied at 95%**

	<b>Employment (FTE)</b>
Direct	416
Indirect	291
Induced	88
<b>Total</b>	<b>795</b>

Source: PwC Analysis

Apart from the above, advanced manufacturing, high-tech, research and development (R&D) can also generate external benefits to the wider economy. The high-tech and R&D Initiatives can strengthen the I&T ecosystem and research capability, build up linkages between technology companies and researchers, attract more foreign investment and talents, nurture I&T talents and start-ups, create more high value-added jobs for new entrants to the labour force, foster the development of Hong Kong as a knowledge-based economy and build a vibrant venture capital investment market.