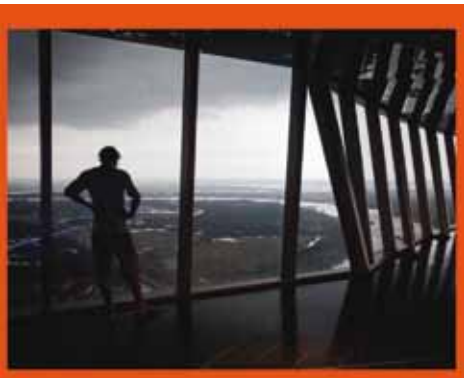
Trade: Exporting to the world | Asia Task Force

UK TRADE & INVESTMENT



# Smart Cities Of The Future In Asia:
# **The Opportunities For UK Business**

# Foreword

In 2010, for the first time, the balance of the world's population living in rural and urban areas reached equilibrium. This "tipping point" represented an important milestone in a long, continuous and accelerating trend of human migration, with forecasts suggesting that the number of people living in cities will reach 70% of the global population over the next 35 to 40 years.[1]

**Nick Baird**
Chief Executive of UK Trade & Investment

In parallel, there has been a rapid growth in the creation of "Mega Cities", conurbations with ten-million or more inhabitants. It is predicted that there will be thirty Mega Cities and fifteen "Mega Regions" – areas with populations in excess of fifteen-million – by 2020 and that ten of the world's top twenty Mega Cities will be from emerging economies.[2]

This dramatic demographic and structural change is creating and compounding a very broad range of challenges (for example, congestion, resource scarcity and pollution) which require local and national bodies as well as private companies fundamentally to reassess the way in which cities are planned, designed, operated and managed and, in particular, how resources are shared.

It is in this context that the concept of a "Smart City" – the systematic integration of ICT and technology into cities – has emerged in recent years as a route to providing citizens with better quality services and a more sustainable environment in which to live. It is forecast that by the year 2020, forty cities on a global basis will be smart, with cities in Asia at the centre of this phenomenon.[3]

UK Trade & Investment has commissioned this report to provide a clear snapshot of 10 markets in Asia that offer exciting current and future opportunities for UK businesses. The report aims to provide an overview of the context in which the deployment of smart products and solutions exists, as well as to supply detailed examples of opportunities available in these markets.

We want to assist you with your objectives around Smart Cities and look forward to supporting you with this process.

February 2012

[1] United Nations
[2] Frost & Sullivan
[3] Frost & Sullivan

# Table of contents


Foreword 2
Table of Contents 3
Executive Summary 5
How To Use This Research 8
Smart Cities in Asia: Context and Drivers 9
**Energy** 10
Principal Challenges 10
Smart Solutions 10
Common Initiatives 10
**Buildings & the Environment** 11
Principal Challenges 11
Smart Solutions 11
Common Initiatives 11
**Education** 12
Principal Challenges 12
Smart Solutions 12
Common Initiatives 12
**Digital Media** 13
Principal Challenges 13
Smart Solutions 13
Common Initiatives 13
**Health** 14
Principal Challenges 14
Smart Solutions 14
Common Initiatives 14
**Transport** 15
Principal Challenges 15
Smart Solutions 15
Common Initiatives 15
Smart Cities in Asia: Comparative Analysis 16
By Stage of development 16
By City 17
What To Do Next 28
Smart Cities in Asia: Ten City Profiles 33
Appendices and Abbreviations 157


This document has been colour coded to help you easily identify each of the six themes. Please see the key below.

# Table of contents: Opportunities


### Hong Kong

| | |
|---|---|
| Buildings & Environment | 36 |
| Digital Media | 37 |
| Education | 37 |
| Energy | 38 |
| Health | 38-39 |
| Transport | 39-40 |

### Indonesia

| | |
|---|---|
| Buildings & Environment | 47-48 |
| Digital Media | 48-49 |
| Education | 49-50 |
| Energy | 50-51 |
| Health | 51-52 |
| Transport | 52-53 |

### Japan

| | |
|---|---|
| Buildings & Environment | 60 |
| Digital Media | 61 |
| Education | 62 |
| Energy | 63 |
| Health | 63-64 |
| Transport | 64-65 |

### Malaysia

| | |
|---|---|
| Buildings & Environment | 75 |
| Digital Media | 76 |
| Education | 76-77 |
| Energy | 78 |
| Health | 79 |
| Transport | 80-81 |

### Philippines

| | |
|---|---|
| Buildings & Environment | 89 |
| Digital Media | 90 |
| Education | 90-91 |
| Energy | 91 |
| Health | 92 |
| Transport | 93 |

### Singapore

| | |
|---|---|
| Buildings & Environment | 100 |
| Digital Media | 101 |
| Education | 101-102 |
| Energy | 102-103 |
| Health | 104 |
| Transport | 105 |

### South Korea

| | |
|---|---|
| Buildings & Environment | 112 |
| Digital Media | 113 |
| Education | 113 |
| Energy | 114 |
| Health | 114-115 |
| Transport | 115 |

### Taiwan

| | |
|---|---|
| Buildings & Environment | 123 |
| Digital Media | 124 |
| Education | 124 |
| Energy | 125 |
| Health | 125 |
| Transport | 126-127 |

### Thailand

| | |
|---|---|
| Buildings & Environment | 135 |
| Digital Media | 136 |
| Education | 136-137 |
| Energy | 137-138 |
| Health | 138-139 |
| Transport | 139-140 |

### Vietnam

| | |
|---|---|
| Buildings & Environment | 147 |
| Digital Media | 148 |
| Education | 148-149 |
| Energy | 149-150 |
| Health | 150 |
| Transport | 151-152 |

# Executive Summary

Smart infrastructures, smart energies, smart mobility, smart buildings, smart grids, smart materials and smart clouds. “Smart” is the new “green”.

Yet, whereas green products and programmes are focused on environmental considerations, smart solutions encompass and extend beyond this to describe a very wide range of applications that are aimed at providing tangible benefits – for example, progress in provision, management and use of transport – to improve to the lives and well-being of city dwellers globally.

The common denominator across all of these solutions is the use of Information Communication Technologies (ICT). The report has therefore taken a broad interpretation of the term “smart” and examined 10 cities across Asia that “are large scale developments which aim to achieve economic, environmental and social sustainability through the systematic integration of ICT into their planning, design, operations and management” with a view to assessing the current level of smart integration and future smart status and opportunities of each. The cities (and markets) were selected by taking into account their potential level of interest to UK companies, and following an initial review of their ‘smart’ status. However, the report did not set out to cover cities in China or India - as other specific UKTI research initiatives on those markets either already exists, or is underway (see www.ukti.gov.uk/india and www.ukti.gov.uk/china for further information).

This report centres on smart initiatives across six themes:

Energy
Buildings and the Environment
Digital Media
Education
Health
Transport

## Selected markets

**Hong Kong**
Hong Kong

**Indonesia**
Jakarta

**Japan**
Tokyo

**Malaysia**
Kuala Lumpur

**Philippines**
Manila

**Singapore**
Singapore

**South Korea**
Seoul

**Taiwan**
Taipei

**Thailand**
Bangkok

**Vietnam**
Ho Chi Minh City

**Executive Summary continued**

Across Asia, the capital cities and major urban centres of advanced and emerging markets are facing a broad range of issues to which smart solutions provide concrete and tangible solutions. From a lack of energy to a lack of space, the challenges are pressing and fundamental which means that, for UK businesses able to successfully penetrate these markets, the opportunity is both immediate and sustainable.

This report highlights that there are a number of common challenges and issues which are driving the uptake of smart solutions.

These include the following:

## Energy

Increasing consumption on the demand side and a lack of raw materials on the supply side, together with ageing Transmission and Distribution (T&D) infrastructure are creating the potential of the perfect energy "storm".

## Buildings and the Environment

A lack of awareness in the private sector, combined with public authorities' unwillingness to enforce existing legislation, is leaving urgent environmental issues such as air pollution under-addressed.

## Education

Fierce competition amongst students in advanced cities and limited accessibility in emerging cities as well as the challenge of learning English and re-skilling an ageing population are shaping education provision.

## Digital Media

A lack of infrastructure on both the fixed and mobile side of the market has historically restrained the deployment of smart "applications and content" across a broad range of application areas.

## Healthcare

Ageing populations, in advanced markets, together with uneven access to and, in many cases, varied quality of care in emerging markets are driving changes in the way in which healthcare is provided and delivered.

## Transport

The population explosion in emerging cities, together with a lack of physical space and the sometimes poor state of repair of "legacy" infrastructure has led to transport overcrowding and traffic congestion.

These challenges are, in turn being addressed by a concerted response from a range of stakeholders. In many cases, it is city-level, regional or national governments which are setting the agenda and building a framework, using a mixture of both incentives and regulation, to encourage private companies to think smart in their product and solution development.

In addition, end-users are increasingly expecting the availability of services ranging from remote healthcare to social networking.

As a result of these drivers and actors, there is a very real opportunity for UK business.

The report has identified a broad selection of more than a hundred smart initiatives and programmes across Asia. From Smart Grids, to Building Automation Systems, to E-learning, to High Speed Broadband, to Electronic Health Records, to Urban Railway Networks – all of the programmes correspond to concrete "on-the-ground" activities, many of which are open in the immediate to short term to support from companies which are able to bring demonstrable IT-based products or solutions to the table.

In Asia, there is however a wide variation in both the number and stage of development of Smart Cities both within and between the countries.

**Executive Summary continued**

This report indicates that UK businesses will find opportunities in each of the markets, with variations in the size, timeline and technology requirements depending on the particular theme and application area of interest.

Some markets have a more mature understanding of and the capability to integrate and accept high value-add solutions. This is the case in Japan and South Korea where Tokyo, Seoul and the smaller centres at, for example, Yokohama and Jeju Island, are already technological centres of excellence but they remain hungry to build on their success and are investing now in the second and third generations of cutting-edge smart solutions.

Cities such as Singapore and Hong Kong will offer potentially more accessible markets, though they may be more competitive in some areas, with a very strong focus on effective government support, especially in Singapore.

In the longer term, markets such as Malaysia and the Philippines will continue the transition from emerging to advanced countries and they, in turn, will look to advanced IT to support the economic and population growth. Here, the development of "green field" infrastructure (such as a state of the art broadband network in Manila) today will facilitate the much broader deployment of smart B2C content, products and solutions of tomorrow.

Whether your focus is on the coming weeks or years; your strength in digital media or healthcare; your competencies in products or services, UK Trade & Investment is here to support you with uncovering and evaluating the smart opportunities which are most appropriate and accessible to your company. To find out more about how we can help you turn these opportunities into business, please refer to the What To Do Next section of this report.

# How To Use This Research

One hundred and twelve individual opportunities are presented in this guide. These opportunities are presented first by market, then by theme (each of which is colour coded throughout), and are outlined in the table of contents on page 3. In addition, the opportunities have been numbered from #1 to #112 for reference.

## Table of Contents

Specific opportunities in this report are hyperlinked directly to the table of contents at the front of the opportunities section.

## Market Context

Each market is introduced with a brief overview of its economic and demographic profile.

## Principal challenges

This section provides a summary of the challenges that are faced in the market, mapped against the themes, to better understand the factors that are driving demand for solutions.

## Smart Solutions

This section is included as a resource to better understand the activities and policies that are being used to drive smart solutions to the challenges identified.

**112**
individual
opportunities

## Opportunities

Opportunities are listed under the theme with which they most closely fit. The opportunities are numbered from #1 to #112 and are laid out in a simple and consistent format. The example below explains how each opportunity is set out and the key information each one will include:

| Opportunity | | |
|---|---|---|
| **Key Challenge** | Describes the challenges that are being faced | |
| **Programme** | Describes the programmes and activities that are being undertaken to deal with the challenge | |
| **Smart Element** | Explains what elements of solution areas involve deployment of smart solutions | |
| **Opportunity** | Summarises the opportunity | |
| **Main Stakeholder** | Lists key stakeholder organisations that would be worthwhile engaging in relation to the opportunity | |
| **Time line** | **Size** | **Technology** |
| Describes opportunity Timeline – see below for key | Describes opportunity Size –see below for key | Describes opportunity Technology Level – see below for key |

## Key

The key below is included at the front of each market section and explains the broad parameters that were used in calculating the relative timeline, size, and technology levels deployed per each opportunity included in the report:

| Timeline | Size | Technology |
|---|---|---|
| **Immediate**<br>Less than 18 months | **Small**<br>Less than £50 million | **Low**<br>Existing/proven technology |
| **Mid term**<br>18 months to 3 years | **Medium**<br>£51 million to £200 million | **Medium**<br>Technology in introduction |
| **Long term**<br>Over 3 years | **Large**<br>Over £200 million | **High**<br>Technology to be introduced |

## Current and Future Smart Integration

This summarises the macro environment, the overall smart opportunity, its relevance to UK capabilities, the timeframe of opportunities and the overall current attractiveness of the market.

## Summary of Hot Spots by Sector

This summarises the key opportunity areas identified by sector.

# Smart Cities in Asia:
# Context and Drivers

The report highlights that there is a range of common challenges and issues - including, for example, resource scarcity and ageing infrastructure and populations - that are driving the uptake of smart solutions within and across the different themes.

These, in turn, are being addressed by concerted responses from a range of stakeholders.

Whether the impetus stems from the public or private sector, the demand or the supply side, organisations or private individuals, it is clear that in each theme - from energy to education - there is a clear sense of momentum behind the move to smart initiatives and a conviction that they represent a key element of the solution to some of the most pressing issues that are facing advanced and emerging cities in Asia today.

The following pages set out the drivers, the principal challenges and issues, the actors, the key pillars of smart solutions, shaping the development of Smart Cities, as well as a number of common initiatives that are simultaneously being developed in multiple markets.

Energy

# Energy

## Principal Challenges

- Increasing energy consumption on the demand side and a lack of raw materials on the supply side, together with ageing and ill maintained Transmission and Distribution (T&D) infrastructure create the perfect energy storm.

Across the emerging world, energy usage has increased and continues to grow dramatically. This report highlights cities in the Philippines, Thailand and Vietnam where the issue – driven primarily by a significant and rapid population spike – is the most pronounced. Indeed, in some cases, excessive demand for energy has reached the extent that power "black outs" are already an occasional occurrence and pose a very real and visible threat to the cities' future growth prospects and international competitiveness.

High demand is compounded in all of the countries – with the notable exception of Indonesia and Malaysia – by a marked lack of resources. There is an absence of locally available fossil fuels leaving city-level, regional and national governments reliant on imports and subsequently exposing themselves to the volatility of raw material and wholesale energy prices, as well as security of supply concerns.

This report highlights that, in addition to this demand and supply side instability, many of the cities also struggle with a lack of legacy or severely ageing energy infrastructure. Bangkok is a clear example of an urban centre where the Transmission and Distribution (T&D) network is no longer sufficient to efficiently manage the power requirements of a rapidly growing and modernising city, whilst the economic downturn and subsequent budget restraints are impacting its ability to effectively repair and maintain the electricity grid.

## Smart Solutions

- Governments and other public authorities are setting the agenda and establishing a framework in which energy efficiency, renewable power and smart grids and metering provide the cornerstones of a smart response.

In the energy theme, given the macro nature of the challenges faced and the generally regulated environment in which private market participants operate, it is city-level, regional and national governments in each of the countries that are providing a framework for a move towards smart solutions. This report highlights that public authorities are calling on a "carrot and stick" approach – employing both incentives and regulations – to encourage and compel players to adopt a range of different strategies and solutions.

Specifically, government led programmes across the cities are aimed at –

1. Creating less wastage on the demand side through the implementation of energy efficiency and conservation solutions, for example, in Ho Chi MinH City, Vietnam.

2. Driving up the contribution of green energy on the supply side through renewable energy targets and, in some cases obligations, for example, in Indonesia.

3. Encouraging greater efficiency in T&D through the roll out of smart grid and metering pilot projects and test programmes, for example, in Jeju Island, South Korea and in Singapore.

## Common Initiatives

The development of smart grids is an initiative that forms a key plank in most Asian country's Energy policies. This report highlights nine programmes in the area, the majority of which are in the planning or testing phase but nonetheless provide immediate and concrete opportunities to UK players able to demonstrate workable solutions in smart metering and the related infrastructure and/or networks.

| | |
|---|---|
| Indonesia | Smart Grid Pilot project |
| South Korea | Nationwide Smart Grid Deployment |
| Taiwan | Advanced Meter Infrastructure |

Five of the ten markets are working to diversify the energy mix by investing in renewable power. Here, the approach is somewhat varied with authorities encouraging and, in some case, mandating a broad range of solutions but the common denominator across the cities is solar power. Malaysia, for example, has a programme aimed at building up Photovoltaic (PV) capacity and lacks the local know how from a technology perspective.

| | |
|---|---|
| Vietnam | Renewable Energy development |
| Philippines | Renewable Energy Act |
| Thailand | Renewable Energy Plan |

Buildings & the Environment

# Buildings and the Environment

## Principal Challenges

- A lack of awareness in the private sector, combined with public authorities' unwillingness to enforce existing legislation, is leaving urgent environmental issues such as air pollution under-addressed.

In general terms, environmental issues have not historically received the same level of attention in Asian markets as in Europe and, to a lesser extent, North America. This is particularly true of the emerging cities in Vietnam, Indonesia, Thailand, the Philippines and Malaysia where the drive for economic growth has taken precedence and, in the private sector, a lack of awareness, knowledge, skills, technologies and training has restrained, for example, the design or construction of "green" buildings to the extent that the market is still in its infancy.

There is a similar story in the public sector. Here, whilst in many markets at least some form of environmental regulation exists, challenges around the non-enforcement of legislation continue to shape the sector. City-level, regional and national governments have proven themselves largely unwilling or unable to compel private citizens or businesses to implement the limited range of smart and more basic solutions which are available to them to protect and improve on the environments in which they live and work.

Despite this, the rapid economic and population growth in the emerging markets, has triggered specific and urgent challenges that stem from increased and often un-checked rises in manufacturing, on one side of the supply-demand equation, and consumption, on the other. The need to more effectively manage waste and waste water as well as reduce air pollution is common to many of the markets, with the latter perhaps most pronounced in Vietnam, where smart solutions have an increasing role to play controlling industrial emissions.

## Smart Solutions

- Increased end-user expectations and financial incentives for environmentally responsible developers and solution providers are driving the deployment of smart initiatives across the abundant green field opportunities.

Across the markets, attitudes are changing and environmental awareness is increasing. This report finds that, in the emerging cities in particular, environmental issues are moving – if not to top of mind – then certainly up the hierarchy of factors which are taken into consideration in city planning.

This change is driven by a number of factors. On one hand, the growing presence of international businesses and increased Foreign Direct Investment (FDI) has been coupled with greater expectations in terms of the way in which, for example, buildings are constructed. On the other hand, we can also note that local governments and other public authorities are assuming a greater role.

- In emerging cities, this often takes the form of financial incentives – such as stamp duty exemption – for private firms to employ smart and green building and environmental solutions.
- In advanced markets e.g. Singapore and Tokyo which are further along the curve in terms of their stage of development greater enforcement of legislation/ regulation is also used as a tool.

One of the characteristics of city development which lends itself to the deployment of smart solutions in the building space in particular is that old buildings in Asia are more construction rather retrofitted which provides "green field" opportunities.

## Common Initiatives

Across the markets, the public and the private sector is turning to building and facility management/automation systems as a means with which to both reduce energy consumption and limit the air and other pollution which is created by industrial and commercial premises. Much of the opportunity for UK control, monitoring and metering smart solution providers lies in the new build segment in advanced and emerging cities.

| | |
|---|---|
| Philippines | Building Automation System |
| Thailand | Integrated Facilities Management Services |
| Japan | Energy Management System |

With increased production and consumption, the need for effective waste management is key to all emerging urban centres which often lack the infrastructure to meet growing demand. The report identifies specific programmes addressing industrial and solid waste in the Philippines and Vietnam respectively, whilst Thailand's waste water programme requires and would welcome the support of smart technology imports.

| | |
|---|---|
| Vietnam | Solid Waste Recycling and Treatment System |
| Philippines | Industrial Waste Exchange Programme (IWEP) |
| Thailand | Wastewater Treatment System |

Education

# Education

## Principal Challenges

- Fierce competition amongst students and limited accessibility in emerging markets as well as the unique challenge of learning English and re-skilling an ageing population are shaping the education theme.

The education landscape in Asia is somewhat polarised.

On the one hand, in the advanced markets (and notably in South Korea, Singapore and Hong Kong,) the system is fiercely competitive with students often under pressure to secure places in and excel at the best schools and universities with a view to furthering their professional and personal development.

On the other hand, in the emerging markets, there is often limited accessibility – even in some of the large urban centres – due to the cost of resources, a lack of teacher training and residual unwillingness of some parents to embrace the education system. Illiteracy remains a problem in certain areas.

In addition, the desire to use English across the region provides a further challenge. The language is commonly taught and used in Singapore, Malaysia, the Philippines and Hong Kong and is seen as an important life skill but the paradox lies in the fact that teaching of the subject is currently often "book-based" with the focus on reading and writing rather than listening and speaking which sometimes impacts students' aural and oral communications skills.

This report also highlights a more recent development. As the population ages, particularly in the advanced markets such as Japan and South Korea, there is a tranche of the population including middle and older aged inhabitants which needs significant support in re-skilling, notably in the domains of IT and Internet.

## Smart Solutions

- A concerted effort to improve the quality and widen the accessibility of education across Asia is centred on smart learning and the roll out of digital and electronic supports, materials and teaching.

This report highlights a concerted effort in the region by city-level, regional and national governments to improve the accessibility and quality of education for learners across the spectrum from pre-school through to retirement. The roll out and use of smart solutions is a cornerstone of this with the early up take of Information Communication Technologies seen as the key to success.

In particular, smart initiatives in the education theme fall into a number of categories –

- E-learning to provide greater flexibility and "interactivity" for students.
- Digital text books to reduce (printing and distribution) costs.
- E-training to equip teachers with the skills to support smart education.
- Remote learning to give access to education to more and eventually all.

Some governments, such as Singapore, Hong Kong and Malaysia have taken this one step further and expressed a wish to be education "hubs" for the region. In the latter, the Early Child Care and Education (ECCE) enhancement scheme has at its heart the development of a network of ECCE centres dedicated to transforming the entire teaching content of the programme to distance learning material and researching innovative teaching techniques.

## Common Initiatives

E-learning, including the development of digital text books, has the potential to go a long way to solving some of the most significant issues facing the education theme in Asia today. By deploying electronic and digital supports, systems and methods in the classroom, local public authorities are seeking to drive up standards, reduce costs and provide a level of interactivity that will, for example, bring English learning to life.

| | |
|---|---|
| Philippines | E-learning Environment |
| Indonesia | E-book |
| Hong Kong | E-learning in Schools |

Smart solutions are also enablers of remote learning which – in turn – is seen as key to improving access to the education system even within cities. Across the markets, remote learning is taking numerous forms, with the Open University programmes in both Japan and Indonesia underpinned by a range of smart solutions and providing classes to younger and older learners alike, from under-graduate degrees to lifelong study.

| | |
|---|---|
| Indonesia | E-exam system |
| Japan | Open University |
| Indonesia | Open University |

Digital Media

# Digital Media

## Principal Challenges

- A lack of infrastructure on both the fixed and mobile side of the market has historically restrained the deployment of smart "content" across a broad range of application areas.

The digital media picture in Asia is very mixed, with significant infrastructure weaknesses in many countries counterbalanced by a real appetite amongst inhabitants of urban areas to "consume" smart content, applications and solutions. Broadband and indeed narrowband penetration, with the notable exception of South Korea, Japan, Singapore and Hong Kong is relatively low. The historical lack of investment in markets such as Vietnam, the Philippines, Indonesia and Malaysia has been driven by a number of factors including –

- The presence of significant barriers to entry including strong government regulation and the foothold of a concentrated group of local market participants.
- The requirement for significant Capital Expenditure (CapEx) weighed against the overall market potential in some cities where the absolute opportunity, driven by population numbers, was viewed as potentially limited.

The story is similar on the mobile side of the market. Here, South Korea has the highest level of penetration globally, whilst Singapore and Hong Kong were first movers in the beginning to build the infrastructure required for 4G Long Term Evolution (LTE) infrastructure.

Together, this lack of smart infrastructure has served to restrain the deployment of smart "content" across, in particular, the emerging markets.

## Smart Solutions

- In response to consumer demand, governments across the markets are accelerating the deployment of state of the art fixed and mobile networks which support the complete range of smart solutions.

Currently, governments across the markets are working to make up for lost time and have launched a series of programmes to roll out the most advanced fixed and mobile communication systems. Given, in many cities, the lack of any significant legacy infrastructure, local authorities have an opportunity to deploy cutting edge technology for the first time in the form of next generation broadband and 4G LTE networks.

This round of recent activity forms something of a collective awakening both on the supply and the demand side. Governments in the region see the provision of first class IT infrastructure as key to their international competitiveness, as well as a backbone to the provision of a whole range of smart solutions, whilst consumers – in the form of private individuals and companies – are increasingly demanding the opportunity to e-bank and e-learn.

Indeed, this report clearly highlights that there is no shortage in the appetite for consumer-focussed content and smart solutions ranging from the mobile payments to social networking. Jakarta in Indonesia is the single largest city market for Facebook globally, for example, whilst the level of mobile phone penetration is high even in those countries where there is not yet the infrastructure to support many apps.

## Common Initiatives

In the immediate term, the primary opportunity in the digital media theme lies in supporting the upgrade of key infrastructure with related services and the smart solutions that its roll out enables. Malaysia is one among many markets working to deploy broadband through its High Speed Broadband (HSBB) initiative. This will provide a connection to premises in Kuala Lumpur and serve as a platform for connected home and other programmes.

| | |
|---|---|
| Malaysia | High Speed Broadband |
| Singapore | Singapore NBN |
| Thailand | National Broadband Policy |

Regardless of the stage and state of its network development, mobile phone penetration in Asia is high. The current and intense round of activity is focussed on the construction of 4G (LTE) networks which enable a range of more sophisticated service and content provision. The report highlights particular opportunity for tele-health provision with the capacity for remote monitoring and diagnostics that this brings.

| | |
|---|---|
| Hong Kong | Hong Kong 4G Deployment |
| Indonesia | 4G (LTE) |
| Japan | Japan 4G Deployment |

Health

# Health

## Principal Challenges

- Ageing populations, in advanced markets, together with uneven access and, in many cases, varied quality of care in emerging markets are driving changes in the way in which healthcare is provided and delivered.

In the advanced markets such as Japan, South Korea, Singapore, fundamental changes in the way in which healthcare is provided and delivered are being driven by the rapidly ageing local populations. Elderly people need more treatment and over a longer period of time, which is increasing the burden on both governments and the younger generations in terms of both costs and, for the latter, emotional support.

In the emerging markets, there is a similar dynamic, with the challenge compounded by uneven access to healthcare and, in many cases, quality of care. This is true of urban areas, as well as remote rural locations where there has been historical under investment in equipment, resources and, in particular, the supporting IT infrastructure has impacted the way in which disease is treated and prevented.

## Smart Solutions

- Initiatives such as home monitoring are fundamentally changing the way in which healthcare is delivered and supporting a broader trend which is the move to preventative and personalised medicine.

Smart solutions are supporting rapid changes on both the “supply” and “demand” side of the healthcare market, principally by the way in which they are increasingly enabling doctors and physicians as well as patients to provide and receive treatment remotely.

- Patients are turning to monitoring systems which allow them to track their condition and receive basic treatments from the comfort of their homes. In this way, smart solutions are supporting a broader trend which is the move towards preventative and personalised medicine to reduce the demand for hospital beds and other resources.

- Doctors in emerging markets are leveraging greater levels of internet penetration to gain access to the latest techniques and technologies through online training programmes. This has the benefit of both developing their skills and competencies as well as freeing up time that was previously spent travelling to forums and seminars.

## Common Initiatives

Tele-healthcare, the provision of remote monitoring and treatment delivery systems, is supporting a broader move to preventative and personalised medicine. By enabling patients and the elderly to check and evaluate their conditions from the comfort of their own home, healthcare providers hope to free up hospital resources by both identifying diseases in their early stages and accelerating patients’ recovery after treatment.

| | |
|---|---|
| Vietnam | Tele-medicine |
| Indonesia | Mobile Tele-medicine System |
| Hong Kong | Tele-homecare |

The use of a common IT platform across and between healthcare providers is seen as key to providing joined up treatment and support. In particular, smart platforms such as Singapore’s National Electronic Health Record and Integrated Clinical Management Systems aim to reduce test duplication and improve the management of diseases. Opportunities exist for from Smart Cards to Electronic Patient Record (ERP) soft - and hardware.

| | |
|---|---|
| Vietnam | Electronic Health Record Management System |
| Singapore | Integrated Health Information System |
| Hong Kong | National Health Smart Card Applications |

Transport

# Transport

## Principal Challenges

- The population explosion, together with a lack of physical space and the sometimes poor state of repair of legacy infrastructure has lead to chronic transport overcrowding and congestion.

The transport system in many of the markets is reaching breaking point. The population explosion across the major emerging urban centres in Asia is causing a huge increase in demand, driving congestion and overcrowding. In many cases, the difficulties have been exacerbated by a somewhat slow or un-coordinated response by the public authorities or those who have responsibility for traffic management.

Whilst the situation is by no means uniform across the markets, the systems in most cities are characterised by chronic traffic jams on roads and crowded public transport. In many markets, the challenge is compounded by a distinct lack of space in which to extend road and rail connections, together with the sometimes poor state of repair of transport infrastructure which in turn influences overall network coverage, as well as the frequency and reliability of private and public transport provision.

In addition to the inconvenience, transport congestion is increasingly impacting city dwellers' lives from both a "human" and economic perspective by –

- Generating emissions which make a significant contribution to air pollution.
- Causing delays which impact delivery and other service providers business.

## Smart Solutions

- Smart solutions in transport are focussed on improved management of the traffic through e-tolls and pricing, the move to electric vehicles and construction of "intelligent" mass transit and rail networks.

Given the demographics and topography of many of the cities, it is difficult (or in some cases impossible) for public authorities to physically enlarge the transport system. It is therefore in this theme more than any other that the provision of smart solutions offers concrete solutions to the everyday problems of congestion that face city-dwellers face.

In general terms, the smart response to transport congestion, co-ordinated by city-level, regional and national governments, falls into three principal categories –

- Traffic management systems such as electronic toll systems and electronic road pricing systems look to ease congestion by distributing and managing traffic density in large city centres.
- Hybrid and electric cars and other vehicles emit fewer pollutants and are, in many markets, subject to government backed ownership incentives as well as infrastructure roll out programmes.
- Rail and rapid transit programmes rely both on the development of new routes and Intelligent Transport Systems (ITS) to integrate differing modes of transport more efficiently and effectively.

## Common Initiatives

There are currently no mass rapid transport or rail systems across many of the markets with commuters and other inhabitants relying on cars and often motorbikes. Governments in Vietnam and Indonesia, for example, are therefore investing heavily in networks with a view to easing congestion. The opportunities for UK business include soft and hard solutions, such as IT station infrastructure and journey planner software.

| | |
|---|---|
| Vietnam | New Urban Railway Network |
| Indonesia | Mass Rapid Transit |
| Singapore | New Rail Network |

Hybrid and electric vehicles are regarded as key to if not reducing congestion then at least minimising its impact by bringing down emissions. Currently, public authority support in the region is centred on providing incentives to drivers to switch vehicles, which leaves the door open for market participants to support with both the planning and implementation of the infrastructure, as well as potentially the supply of the vehicles themselves.

| | |
|---|---|
| Philippines | Electric Vehicle Programs |
| Malaysia | Green Technology Vehicles |
| South Korea | Electric Car Monitoring |

# Smart Cities in Asia: Comparative Analysis

## By Stage of development

In Asia, there is a wide variation in the stage of development of Smart Cities both within and between countries. Cities such as Singapore, Hong Kong, Seoul and Tokyo can already be considered to be smart, whilst conurbations in Malaysia, the Philippines, Thailand and Vietnam, for example, are behind the curve in terms of their current status but are evolving quickly.

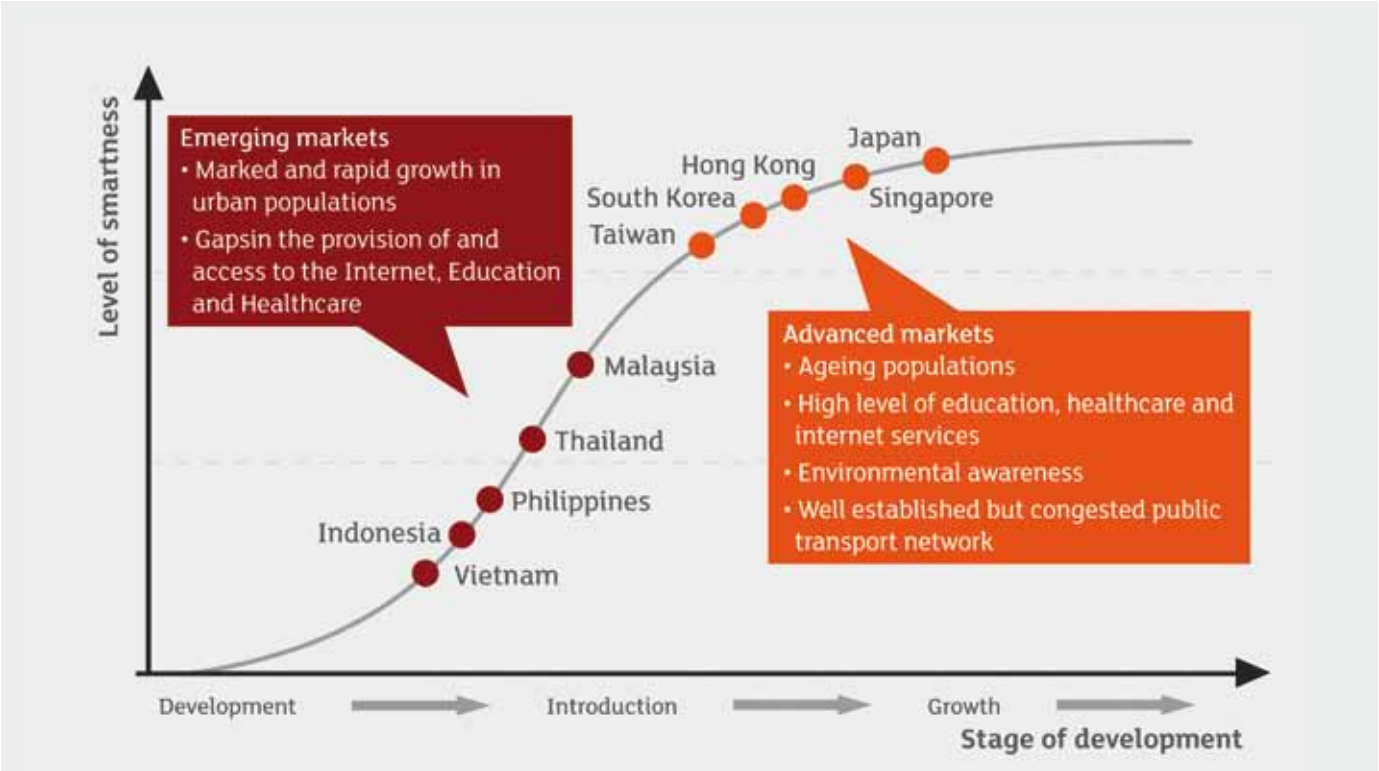
Whilst the characteristics of the advanced countries differ from those of the emerging markets many of the issues that each faces are fundamental and therefore similar – and the smart opportunity therefore varies only subtly from one group to the next.

It is notable that both Japan, the most advanced Smart market, and Indonesia, which is firmly in the second group, are developing 4G LTE mobile networks. The difference – and this is a trend that repeats itself across the themes – is that the former is a network upgrade whereas the latter is closer to a green field roll out with the country effectively "skipping a cycle" in its infrastructure development.

This report indicates that UK businesses will find opportunities in all of the markets, emerging and advanced, with variations in the size, timeline and technology requirements depending on the particular theme and application area of interest.

**Stage of Development of Smart Cities**

Illustration of the current level of deployment of smart products and solutions in each City versus its overall stage of development in the move towards becoming a Smart City.



# Smart Cities in Asia: Comparative Analysis

## By City

**Smart City attractiveness assessment**

This report has assessed each city against a range of four principal factors in order to gauge and assess the overall attractiveness of each to UK business.

These factors include:

**Macro environment** – an assessment of the macro factors which would facilitate or support UK companies' ability to conduct smart business in each of the cities.

This factor takes into account the extent to which demographic, topographic, and economic considerations are shaping the need for smart products and solutions as well as the local capacity to invest.

Key: **High = good for UK business**

**Smart opportunity** – an assessment of the depth, breadth and sustainability/ robustness of the smart opportunity in each city, taking into account the current and future programmes.

This factor takes into account the way in which the selected smart programmes are distributed or concentrated across the 6 themes and considers the actors behind each of the initiatives.

Key: **High = good for UK business**

**Fit with UK capabilities** – an assessment of the fit of the key themes against the UK's ability to supply "high" technology solutions, as well as the relative accessibility of each city This factor takes into account the extent to which each city requires the type of cutting edge, high technology smart solutions that UK businesses offer and the likelihood of local competition.

Key: **High = good for UK business**

**Timeline and outlook** – an assessment of the extent to which the identified programmes and initiatives in each city are open to UK businesses in the immediate or short term.

This factor takes into account the number of the selected smart programmes that require or would be open to support and input from UK businesses in the coming months and years.

Key: **Immediate = good for UK business**

On the basis of this assessment, the ten markets fall into four groups of opportunity for UK businesses seeking to launch smart solutions in the region.

**Group 1.** Tokyo and Seoul are the most advanced cities and require highly advanced technological solutions across a broad range of themes. Despite a relative lack of English language skills and a historical preference for working with local companies or consortia, the sheer breadth of the opportunity, together with tendency in each market to "test" smart solutions in areas outside of the capital, provides additional market options to UK business.

**Group 2.** Singapore, Hong Kong and Taipei are also advanced cities with a need for the deployment of medium and high technology solutions. Whilst each is open to and encourages foreign trade, it is to be expected that UK companies seeking to enter these markets will face strong competition from local players, in Hong Kong and Taipei in particular, as well as from other international businesses stemming from the US, Japan, Korea and elsewhere.

**Group 3.** Kuala Lumpur and Manila are emerging cities with a mixed requirement for low, medium and highly advanced technological solutions. These are focused on a somewhat narrower range of infrastructure-orientated themes such as transport. The cities welcome international investment and the wide spread use of English – an official language in each – should allow UK companies to conduct business with greater ease.

**Group 4.** Ho Chi Minh City, Jakarta and Bangkok are also emerging cities. Here, the focus is on smart solutions which are less technologically sophisticated than elsewhere. The report suggests that, whilst support from the UK and other countries will be required in the longer term, these markets will be more challenging to penetrate in the shorter term with the strong role of local governments and, in some cases, restrictions on foreign ownership acting as a barrier to entry.

# Hong Kong - Hong Kong

| | Remarks | Level |
|---|---|---|
| Macro Environment | Hong Kong is a rapidly growing city with 7.1 million inhabitants, a number which is expected to grow to 7.5 million by 2016. Densely populated centres such as Hong Kong require smart solutions to manage high demand across the building, digital, education, energy, healthcare and transport themes in particular. Hong Kong is an advanced economy with GPD per capita at USD 31,590 and a real appetite for and capacity to continue to invest in smart solutions. | High |
| Smart Opportunity | The report selects ten smart initiatives in Hong Kong, many of which benefit from strong government support and therefore appear both concrete and sustainable. The breadth and depth of opportunity here is amongst the most significant across the markets, with the current initiatives requiring a high level of technological sophistication (five of ten ranked as medium or higher for technology) and more programmes coming online. | High |
| Fit with Capability | Hong Kong is open to foreign investment and receptive to importing know how and expertise, whilst the most advanced technology products and solutions that the UK businesses have to offer would find a place in a city that is to all intents and purposes already smart. Nonetheless - given this openness - UK companies will find themselves competing against Japanese and US market participants as well, of course, local providers from Hong Kong and mainland China. | Medium |
| Timeframe | As one of the most advanced Smart Cities in Asia, there is an abundance of projects that are ongoing and new initiatives in the immediate to short term pipe line, including, for example, the utilisation of Energy Efficient Heat Recovery Systems in commercial buildings, the construction of a 4G digital mobile network, the roll out of e-learning programmes in schools and the shift to hybrid and electric vehicles to reduce pollution. | Immediate |

# Indonesia - Jakarta

| | Remarks | Level |
|---|---|---|
| Macro Environment | Jakarta, with its population of 9.5 million in 2010, is a draw for companies which provide B2C products and services. Despite its rapidly growing economy, GDP per capita remains low, transport and energy infrastructure is ageing and the market for smart solutions is therefore somewhat immature. There is however significant demand side "pull" as indicated by the fact that Jakarta is the global capital of the website Facebook in terms of the number of users. | Medium |
| Smart Opportunity | One of the chief challenges in the country is to cope with the large and growing population, as well as the influx of 5.4 million commuters each day from satellite conurbations. Much of the focus is therefore on transport, with schemes to develop a Mass Rapid Transit system, upgrade the existing road pricing project, and roll out an integrated e-ticketing platform all requiring immediate input and support from smart solutions providers. | Low |
| Fit with Capability | Jakarta is receptive to technologies which have been proven to work in other markets. UK companies with demonstrable track records of success in their home and/or other advanced markets will therefore be able to transfer their smart solutions to address the local needs. Since the decision making process can be reasonably bureaucratic and political, tie ups with local players and strong representations to government agencies will smooth entry. | Low |
| Timeframe | There is a broad range of smart projects in the pipeline but it is common in Jakarta that the ambitious initial timetables slip as budget constraints and political issues emerge. Whilst there is no doubting the absolute opportunity and local appetite for smart solutions, it is therefore more difficult to pin point, with certainty, the timing of roll out. Four of the thirteen selected initiatives were classified as immediate to long term for this reason. | Long term |

# Japan - Tokyo

| | Remarks | Level |
|---|---|---|
| Macro Environment | Tokyo is the largest city globally, with approximately 35 million residents, and Japan is the third largest economy in the world in terms of absolute GDP, although growth is currently stagnant. The city will continue to be shaped by an ageing and, unusually in the terms of this report, decreasing population which will trigger challenges in the healthcare, building and transport (mobility) themes in particular. Very high awareness of environmental issues is a key characteristic of Tokyo. | High |
| Smart Opportunity | In Tokyo, as in Hong Kong, the smart opportunity is amongst the most sophisticated and varied. In addition to programmes which are common to many of the cities, such as the increasing introduction of building control systems, Tokyo distinguishes itself with range of initiatives that are at the cutting edge of smart. Examples of these include innovative green roofing systems and healthcare robotics. | High |
| Fit with Capability | Japan is unusual in that many smart initiatives, at least in their formative stages, occur not only in Tokyo but also in other regional cities. Smart exhibitions are held across the countries, providing UK businesses with an opportunity to show case their solutions. These should generally be well received, as Tokyo is at the forefront of the Smart City concept, but potential market entrants will need to reckon with intense competition from the innovative local players. | High |
| Timeframe | Although the decision making and planning process in Tokyo and Japan as a whole can be reasonably long, many smart initiatives are currently reaching the end of their lead-in time and entering the initial phases of roll out meaning that the immediate opportunity is rich across, for example, the education, healthcare and transport themes. Since the city is already smart, there is also a very healthy group of mid to long term projects. | Immediate |

# Malaysia - Kuala Lumpur

| | Remarks | Level |
|---|---|---|
| Macro Environment | Kuala Lumpur and Malaysia as a whole is in the midst of a transition from a emerging to an advanced economy. With annual growth in the region of 6% and GDP per capita at USD 15,800, there is significant appetite for and expectation of more sophisticated smart solutions to alleviate some of the issues that the city or country is currently facing. In the short term, however, improvements in the communication and transport infrastructure are also required. | Medium |
| Smart Opportunity | In line with its overall development, Kuala Lumpur has ambitious plans for smart solutions across the board with programmes and initiatives in every theme driven by government led frameworks and incentive schemes. The Ministry for Education for example is using technology as a cornerstone of its policy to boost literacy and improve the quality and accessibility of education. Government involvement is also high in transport. | Medium |
| Fit with Capability | Kuala Lumpur is very open to international business. This can be regarded as both an opportunity and a challenge to UK businesses since it favours their entry to the market but also allows for fierce competition from Europe, North America and elsewhere in Asia. There is likely to be a local preference for smart solutions which have already been shown to work in other markets, with the levels of IT sophistication required towards the lower end of the smart scale. | Medium |
| Timeframe | Give the fact that Kuala Lumpur is on the crest of a wave of growth, there is a very real opportunity to support the roll out of smart solutions in the city over the short term. The report identified 8 smart initiatives which it defined as “immediate”, with the remaining 5 falling into the mid-term category. UK business addressing the market should, however, be aware of the potential for some delays as timetables tend to slip back. | Immediate |

# Philippines - Manila

| | Remarks | Level |
|---|---|---|
| Macro Environment | Manila is one of the largest "markets" in the Philippines, accounting for 33% of GDP and contributing 41% of the country's total tax collections. Despite this, the capital accounts for only 0.2% of the country's total landmass and its potential for expansion is limited. This, together with the geographical fragmentation of the rest of the island nation and relatively low GDP per capita (USD 2,000), means that the logistics of wide scale smart implementation are complicated. | Low |
| Smart Opportunity | In recent years, the Philippines has received significant financial assistance and other guidance from the ADB, the IMF and countries such as Japan and Australia to support it to develop further. With continued economic and population growth, the focus of these programmes has been on the infrastructure sector, as reflected by the presence of waste management, broadband and transport programmes amongst the initiatives that have been identified. | Medium |
| Fit with Capability | Manila and the Philippines in general uses English as an official language which will be to the advantage of UK businesses looking to penetrate the market. In addition, as noted above, the level of foreign "framework" assistance has helped to ease entry for international market participants. The report reveals however that the majority of the solutions (five of the ten selected), although concrete and immediate, require relatively low IT input. | Medium |
| Timeframe | The report highlights that there is a short term need for smart solutions in Manila. In many of the themes, the authorities are in the early stages of long term programmes (such as the BESRA Key Reform Thrust in Education, the Renewable Energy Act or the Philippines Energy Plan and the National Electric Vehicles Programme in transport) which therefore require immediate input to support with test schemes and early implementation. | Immediate |

# Singapore - Singapore

| | Remarks | Level |
|---|---|---|
| Macro Environment | Singapore is a relatively small city-country with a total population of 5 million, which is expected to increase to 6.5 million by 2030. This rapid demographic and continued economic growth, means that the city is rare example of an advanced market that has continued to thrive during the downturn and, with GDP per capita of USD 43,867 in 2010, has both the need and the means with which to ambitiously pursue the use of smart solutions across the themes. | High |
| Smart Opportunity | The report shows that the smart initiatives which are underway or in the pipeline are characterised by strong government support. This is a trend that is expected to continue moving forwards, with projects such as the BCA Green Mark Scheme, the 3rd Master Plan for ICT in education and the ERP road pricing programme all providing frameworks for the immediate and continued adoption of smart solutions. | High |
| Fit with Capability | Singapore is very open to foreign investments and capabilities, with most smart programmes put out to public tender. There is therefore a fair opportunity for UK companies to enter the market but also the likelihood of strong competition from both local and international businesses. UK companies with technical strength will be attracted to the market, since twelve of the thirteen projects are ranked as requiring medium or high input from a technology standpoint. | Medium |
| Timeframe | The report highlights that there is a strong mix of both short and longer term projects for smart solutions providers in Singapore. Since many of the opportunities stem from government initiatives, there is need for immediate input into projects such as the Experimental Power Grid Research Centre which, if successful, is expected to develop into a broader initiative as the technology is subsequently rolled out widely. | Medium term |

# South Korea - Seoul

| | Remarks | Level |
|---|---|---|
| **Macro Environment** | Seoul, like Tokyo, is a very advanced metropolis with a slightly decreasing and rapidly ageing local population. There is therefore a focus on the use of smart solutions as a means to which to improve the quality of healthcare in particular. The rate of smart adoption is relatively high due to strong economic growth (GDP per capita stood at USD 20,265 in 2010) and the presence of an existing, and advanced, system of IT infrastructure which provides a backbone for rapid roll-out of solutions to a wide audience. | **High** |
| **Smart Opportunity** | There is a broad range of opportunity across the themes. In addition to healthcare, the buildings theme provides a real focus with green construction a hot topic in Seoul in the form of both the Self-Sufficient Building and Sustainable Building Design initiatives. Indeed, environmental awareness is strong across the board as reflected by Electric Car Monitoring Programme and the ambitious Nationwide Smart Grid deployment projects. | **High** |
| **Fit with Capability** | Seoul, whilst an attractive market in absolute terms, may be more difficult than some for UK businesses to enter. This is in part due to the strength and expertise of Korean companies such as Samsung and LG which, in some cases, lead local conglomerates in shaping the smart initiatives in the country. Nonetheless, there is greater geographical diversity than elsewhere with the Smart Grid and EV projects based on Jeju Island. | **High** |
| **Timeframe** | As an advanced market, the availability of smart opportunities varies from the very short term to longer term initiatives such as that centred on Self Sufficient Buildings which does not expect to reach completion until 2018-2025. In contrast, the healthcare programmes – as befits the nature and immediacy of the challenge of caring for an ageing population – require input and support in the coming weeks and months rather than years. | **Medium term** |

# Taiwan - Taipei

| | Remarks | Level |
|---|---|---|
| Macro Environment | Taipei, with its location at the tip of Taiwan, is both one of the most densely populated urban areas in the world and a strategic gateway to mainland China. The city has therefore attracted global companies and is renowned for its strength in the area of ICT. It is this that provides a platform for smart initiatives across the themes and in transport in particular, where the city's restricted land-mass is a challenge. GDP per capita stands at USD 48,400. | High |
| Smart Opportunity | With its existing expertise in the ICT space, the presence of modern and efficient supporting infrastructure and the appetite and funds to invest, Taipei is in many respects the ideal test bed for all smart solutions. This is reflected in its interest in cutting edge areas including the deployment of "intelligent" systems to enhance the existing rail and road systems, as well as advances in the buildings theme through the provision of energy saving services. | High |
| Fit with Capability | Taiwan is amongst the most successful countries globally for attracting and securing FDI. In 2010, cumulative investments of around USD 111 billion had been recorded and stand as testament to the openness of the market to foreign support and cooperation. Taipei already has the technological infrastructure to aid the roll-out of advanced smart solutions of the type supplied by the UK's businesses. All but one of the initiatives is medium or high. | Medium |
| Timeframe | In Taipei, there is a broad range of programmes and initiatives which are currently in the early stages of roll out. Examples include the Taiwan e-learning project, in the education theme, and the Healthcare Innovating Services programme which are two from five initiatives which have been classified as immediately of interest to businesses seeking to penetrate the markets. | Immediate |

# Thailand - Bangkok

| | Remarks | Level |
|---|---|---|
| Macro Environment | Bangkok is a city with more than 9 million inhabitants and has an economy that has been growing rapidly in recent years thanks to significant foreign investment and, in parallel, an influx of global manufacturers in the automotive and other sectors establishing their regional headquarters in the city. Bangkok was hit by heavy flooding in 2011 but is recovering and has gained a reputation as a rapidly growing market for smart solutions. | Medium |
| Smart Opportunity | Thailand is an emerging economy and this is reflected in the relatively narrow range and nature of smart initiatives which are finding traction in the country. Bangkok is among the most densely populated cities globally and this is reflected in the city's focus on the transport theme, with programmes to grow the local and regional rail systems and manage their use and expansion in a smarter way. | Low |
| Fit with Capability | Bangkok will require input from companies able to offer existing and proven smart solutions, rather than those at the very cutting edge of technological development. The report classified the clear majority of the opportunities in the city as "low" or "medium" from this perspective. The city is relatively open to foreign direct investment and trade although, in some areas and themes, there are restrictions on the foreign ownership of companies. | Low |
| Timeframe | Given the urgency of some of the challenges that the city faces and its more general stage and rate of economic development, it is clear that the market offers concrete and immediate opportunities to the providers of smart solutions. Of the twelve initiatives selected, eight will be "online" in the short term whilst the remainder have a medium term outlook. It is expected that further waves of smart programmes will follow suit. | Immediate |

# Vietnam - Ho Chi Minh City

| | Remarks | Level |
|---|---|---|
| Macro Environment | Ho Chi Minh City (HCMC) is at the hub of an economy which is growing at 11.8% annually. This, combined with rapid demographic expansion – the population is expected to reach 8.2 million in 2015, up from 7.4 million in 2010 – is driving a range of challenges and the development of new urban districts in which smart solutions will play an important role. The overall opportunity is, however, tempered by low GDP per capita of USD 2,800. | Low |
| Smart Opportunity | Compared with some of the other markets, the smart opportunity is somewhat limited. Nonetheless, the government is beginning to support a range of initiatives which are aimed at tackling some of the most pressing issues that the country is currently facing such as improving waste management systems and reducing air pollution. In addition, technology is seen as a key plank of the reform of education and boosting English language learning. | Medium |
| Fit with Capability | HCMC currently requires smart solutions that are relatively "low cost". Proven technologies will therefore find a place in a country where the majority of the opportunities are for low or medium level initiatives. UK businesses seeking to enter the market will benefit from strong relationships in government circles where there may be a residual preference for working with companies that stem from Development Assistance Committee countries including, for example, Japan. | Low |
| Timeframe | Vietnam is still in the development stage from a smart solution perspective. The majority of the initiatives, whilst currently in the early stages of roll out, are therefore likely to require several months until they reach wide scale deployment. In addition, it is expected that there may be some delays in the initial timetables since the continued and immediate focus in the country remains on economic growth in other less hi-tech themes. | Long term |

# Found an opportunity? What to do next...

Whether a firm is starting out or experienced in exporting, UK Trade & Investment's services can help to make doing business internationally as easy as possible. They include...

### Passport to Export
Provides new and inexperienced exporters with the training, planning advice and ongoing support they need to succeed in overseas markets.

### Export Communications Review (ECR)
Assesses the way companies communicate with overseas customers and makes practical recommendations for improvement.

### Market Visits and Trade Missions
Organised to help UK companies visit the market they're interested in and talk face-toface with prospective business partners.

### Events and Seminars
Held across the UK and overseas, these briefings offer business/networking opportunities and market information and allow UK firms to showcase their capabilities.

### www.ukti.gov.uk
An invaluable source of up-to-date country, theme, event and contact information. Bookmark the url and set up alerts to receive daily content updates.

### Overseas Business Risk
UK Trade & Investment and the Foreign & Commonwealth Office can provide key information to help you manage the risks of doing business overseas.

### High Value Opportunities (HVO) programme
Through its global network, UKTI is able to provide support to UK businesses in identifying, prioritising, and accessing large scale overseas procurement opportunities, ranging from major infrastructure, manufacturing and engineering projects, through to big supply or value chain opportunities.
www.ukti.gov.uk/uktihome/aboutukti/item/219720.html

### Gateway to Global Growth
Offers a strategic review, planning advice and support to experienced exporters to help them build on their success and develop new overseas markets.

### Overseas Market Introduction Service (OMIS)
A chargeable, tailored service to access market and industry information, identify potential contacts or plan events.

### Export Marketing Research Scheme (EMRS)
Offers support, advice and some grant funding to eligible companies wishing to research a potential export market.

### Tradeshow Access Programme
UK Trade & Investment's Tradeshow Access Programme (TAP) provides grant support for eligible SME firms to attend overseas exhibitions.

### Business Opportunities
Personalised email alerts informing businesses about relevant opportunities and developments.

### Next Steps
For more information on UK Trade & Investment services, call 020 7215 8000 or visit www.ukti.gov.uk. To find your local International Trade Adviser, click 'Export, UK regions' and enter your postcode. Alternatively scan the Quick Response code on the right with your smartphone.

# Table of opportunities by market


**Hong Kong**

| Theme | Opportunity | | Page |
|---|---|---|---|
| Buildings & Environment | # 1 | Building Automation System | 36 |
| | # 2 | Smart energy saving technologies | 36 |
| Digital Media | # 3 | 4G Network Deployment | 37 |
| Education | # 4 | e-Learning in Schools | 37 |
| Energy | # 5 | Smart Grid Plan | 38 |
| Health | # 6 | Integrated Health Information System | 38 |
| | # 7 | Telehomecare | 39 |
| Transport | # 8 | Extension of Railway Network | 39 |
| | # 9 | Green Technology Vehicles | 40 |

**Indonesia**

| Theme | Opportunity | | Page |
|---|---|---|---|
| Buildings & Environment | # 10 | Rooftop landscaping | 47 |
| | # 11 | Green Integrated Facilities Management | 47 |
| | # 12 | Waste Management System | 48 |
| Digital Media | # 13 | 4G Network Deployment | 48 |
| | # 14 | Mobile Payments | 49 |
| Education | # 15 | E-book | 49 |
| | # 16 | E-exam system | 50 |
| Energy | # 17 | Renewable Energy | 50 |
| | # 18 | Smart Grid Pilot project | 51 |
| Health | # 19 | Mobile Telemedicine System | 51 |
| | # 20 | Mobile Midwifery Services | 52 |
| Transport | # 21 | Mass Rapid Transport | 52 |
| | # 22 | Integrated E-ticket | 53 |
| | # 23 | Electronic Road Pricing | 53 |

**Japan**

| Theme | Opportunity | | Page |
|---|---|---|---|
| Buildings & Environment | # 24 | Energy Management System | 60 |
| | # 25 | Green Roof System | 60 |
| Digital Media | # 26 | 4G Network Deployment | 61 |
| | # 27 | Cloud Computing | 61 |
| Education | # 28 | Open University | 62 |
| | # 29 | Eco School | 62 |
| Energy | # 30 | Smart Meter Management | 63 |
| Health | # 31 | Consumer Robotics | 63 |
| | # 32 | Telehomecare | 64 |
| Transport | # 33 | EV Car Sharing | 64 |
| | # 34 | Intelligent Transport Systems | 65 |
| | | Additional summary opportunities in Japan | 68 |

**Malaysia**


| Theme | Opportunity | | Page |
|---|---|---|---|
| Buildings & Environment | # 35 | Building Management System | 75 |
| | # 36 | Water Efficiency | 75 |
| Digital Media | # 37 | High Speed Broadband (HSBB) | 76 |
| Education | # 38 | Entry Point Projects (EPPs) Theme 1: Rapid Scaling Up | 76 |
| | # 39 | Advance Learning System | 77 |
| | # 40 | LINUS Smart learning | 77 |
| | # 41 | Smart grid | 78 |
| Energy | # 42 | Solar Power Capacity | 78 |
| Health | # 43 | Telehealth and Telemedicine | 79 |
| | # 44 | Senior Assisted Living | 79 |
| Transport | # 45 | Integrated ticketing & AFC | 80 |
| | # 46 | High Speed Rail System | 80 |
| | # 47 | Green Technology Vehicles | 81 |
| | # 48 | Integrated Urban MRT | 81 |
| | | Additional summary opportunities in Malaysia | 84 |


**Philippines**


| Theme | Opportunity | | Page |
|---|---|---|---|
| Buildings & Environment | # 49 | Industrial Waste Exchange Program (IWEP) | 89 |
| | # 50 | Building Automation system | 89 |
| Digital Media | # 51 | NGN | 90 |
| Education | # 52 | High Competency for All Teachers | 90 |
| | # 53 | E-learning Environment | 91 |
| Energy | # 54 | Renewable Energy Act | 91 |
| Health | # 55 | 3G based healthcare ICT applications for rural areas | 92 |
| | # 56 | Telemedicine | 92 |
| Transport | # 57 | Intelligent Transport System | 93 |
| | # 58 | Electric Vehicle Programs | 93 |


**Singapore**


| Theme | Opportunity | | Page |
|---|---|---|---|
| Buildings & Environment | # 59 | Green Buildings | 100 |
| | # 60 | Storm-water Management System | 100 |
| Digital Media | # 61 | National Broadband Network | 101 |
| Education | # 62 | 3rd Masterplan for ICT in Education | 101 |
| | # 63 | New Continuing Education & Training (CET) Campuses | 102 |
| Energy | # 64 | Experimental Power Grid Centre (EPGC) | 102 |
| | # 65 | Development of Micro Grid test bed | 103 |
| | # 66 | Intelligent Energy Systems | 103 |
| Health | # 67 | Integrated Health Information System | 104 |
| | # 68 | Assisted Living Technologies | 104 |
| Transport | # 69 | Electronic Road Pricing II | 105 |
| | # 70 | New Rail Network | 105 |

**South Korea**

| Theme | Opportunity | | Page |
|---|---|---|---|
| Buildings & Environment | **# 71** | Self-sufficient buildings | 112 |
| | **# 72** | Sustainable building designs and consulting | 112 |
| Digital Media | **# 73** | Near Field Communications (NFC) | 113 |
| Education | **# 74** | Smart Education Project | 113 |
| Energy | **# 75** | Nationwide smart grid deployment | 114 |
| Health | **# 76** | Wonju Medical City | 114 |
| | **# 77** | Assisted living applications | 115 |
| Transport | **# 78** | Electric Car Monitoring | 115 |
| | | Additional summary opportunities in South Korea | 118 |

**Taiwan**

| Theme | Opportunity | | Page |
|---|---|---|---|
| Buildings & Environment | **# 79** | Energy efficiency ventilation system | 123 |
| | **# 80** | Energy Efficiency Monitor and Management System | 123 |
| Digital Media | **# 81** | TPE-Free/Optical Fiber Network | 124 |
| Education | **# 82** | Digital Education and E-Learning | 124 |
| Energy | **# 83** | Advanced Meter Infrastructure | 125 |
| Health | **# 84** | Tele-health | 125 |
| Transport | **# 85** | Green Transport Solution | 126 |
| | **# 86** | Intelligent Transport Systems | 126 |
| | **# 87** | Intelligent Railway Solutions | 127 |
| | | Additional summary opportunities in Taiwan | 130 |

**Thailand**

| Theme | Opportunity | | Page |
|---|---|---|---|
| Buildings & Environment | **# 88** | Integrated Facilities Management Services | 135 |
| | **# 89** | Wastewater Treatment System | 135 |
| Digital Media | **# 90** | 3G Network Deployment | 136 |
| Education | **# 91** | One Tablet Per Child Project | 136 |
| | **# 92** | Thailand Cyber University Project | 137 |
| Energy | **# 93** | Nationwide Smart Grid | 137 |
| | **# 94** | Renewable Energy plan | 138 |
| Health | **# 95** | Mobile healthcare delivery | 138 |
| | **# 96** | Telemedicine, eLearning and remote surveillance | 139 |
| Transport | **# 97** | New Rapid Mass Transport Network | 139 |
| | **# 98** | Bangkok Smart Card | 140 |
| | **# 99** | Intelligent Transport System | 140 |

**Vietnam**

| Theme | Opportunity | | Page |
|---|---|---|---|
| Buildings & Environment | **# 100** | Solid Waste Recycling and Treatment System | 147 |
| | **# 101** | Industrial Air Pollution Control System | 147 |
| Digital Media | **# 102** | Smart Devise Manufacturing Cluster | 148 |
| Education | **# 103** | e-Learning Solutions | 148 |
| | **# 104** | Teaching and Learning English | 149 |
| Energy | **# 105** | Renewable Energy development | 149 |
| | **# 106** | Energy Efficiency | 150 |
| Health | **# 107** | Electronic Health Record Management System | 150 |
| | **# 108** | Telemedicine | 151 |
| Transport | **# 109** | Intelligent Transport Systems | 151 |
| | **# 110** | Automatic E-Ticketing | 152 |
| | **# 110** | New Urban Railway Network | 152 |
| | **# 112** | Smart Parking System | 153 |

# Hong Kong

# Hong Kong

**P34 Context**

Demographic and Macro Economic Context
Principal Challenges
Smart Solutions

**P36 Opportunities**

Buildings and Environment
Digital Media
Education
Energy
Health
Transport

**P41 Current and Future Smart Integration**

**P42 Summary of Hot Spots by Theme**

**Key:**

This key explains the broad parameters that were used in calculating the relative timeline, size, and technology levels deployed per each opportunity that follows:

| Timelines | Size | Technology |
|---|---|---|
| **Immediate**<br>Less than 18 months | **Small**<br>Less than £50 million | **Low**<br>Existing/proven technology |
| **Mid term**<br>18 months to 3 years | **Medium**<br>£51 million to £200 million | **Medium**<br>Technology in introduction |
| **Long term**<br>Over 3 years | **Large**<br>Over £200 million | **High**<br>Technology to be introduced |

**UKTI Contact in Hong Kong:**
Stephen Cartwright
Trade Commissioner
Stephen.Cartwright@fco.gov.uk

# Demographic and Macro Economic Context

**Brief Overview of Hong Kong**

- Hong Kong is an island city with a surface area of 1,104.4 km$^2$ and 7.1 million inhabitants. It is one of the most densely populated areas in the world.
- Hong Kong is known as Asia's world city, with a strategic position as a regional and international business centre and the gateway to Mainland China. It is also the preferred transport and logistics hub in Asia.
- With the aim to further build a knowledge-based economy, Hong Kong is focused on development of 6 industries, namely education services, medical services, testing and certification, innovation and technology, cultural and creative industries, and environmental industries.

## Demographic Profile

- Hong Kong's current population is 7.1 million and slated to grow to 7.5 million in the next 6 years, due to immigration and increasing birth rates.
- Hong Kong does face problems of high life expectancy and an ageing population, typical to developed nations.
- 95% of the population are of Chinese descent, while the remaining are foreigners with largest groups from Indonesia and the Philippines.

## Economic Profile

- Hong Kong's GDP was USD 225 billion in 2010, an increase of 33% over the last decade.
- GDP per capita increased by 25% from USD 25,200 in 2000 to USD 31,590 in 2010.
- Service industry employs 88% of the total population followed by Construction at 7.7% and Manufacturing at 3.5% in 2010.
- The unemployment rate was 4.4% in 2010.

## Principal Challenges

| | |
|---|---|
| Buildings & Environment | • The market competition is intense with high penetration and high involvement rate from established global building technology companies.<br>• High brand awareness associated with well known building technology related companies that have a good foothold in the market. |
| Digital Media | • The Hong Kong government is quite open and receptive to implementing smart initiatives, the fact that the city's population is relatively small has made it a test market for many ICT initiatives. |
| Education | • The Education system is heavily exam oriented, resulting in a passive learning attitude and a lack of critical thinking, analytical and problem solving skills.<br>• Standard of English declining – prevalent across the school-aged and the employed. |
| Energy | • Increase the share of renewable energy in the power mix.<br>• Transmission and Distribution network management for a reliable grid.<br>• Ensuring efficient use of energy through increased customer interaction. |
| Health | • Rapidly Ageing Population. By 2039, the dependency ratio – the number of elderly people (65 and above) over the mostly economically productive ones (15-64) — will almost double to 625 from 337 in year 2010.<br>• Burgeoning Health Deficit – lack of medical pension or healthcare financing schemes. |
| Transport | • High congestion during peak hours both in public transport and on road.<br>• Lack of ring roads and highways, limited road network coverage and parking space. Poor connectivity between transport modes, lack of public mass transit, high dependence on private transport, poor transport management systems. |

## Smart Solutions

| | |
|---|---|
| Buildings & Environment | • High acceptance and awareness of the need for technology advancement and building solutions, partly due to a large number of high rise buildings and multinational companies setting up base in Hong Kong. |
| Digital Media | • Hong Kong has one of the most competitive fixed broadband markets in the world and was also one of the first to deploy 4G LTE services. |
| Education | • Hong Kong is positioning itself as a regional education hub.<br>• Several initiatives are already in place to incorporate information technology in education at all levels. |
| Energy | • Support for smart energy solutions in Hong Kong from the leading utility, CLP.<br>• A strong economy which makes the investment in smart energy easier compared to other Asian peers. |
| Health | • Healthcare smart solutions is made available through its healthcare infrastructure, with extensive innovations in finance and ICT. Innovative Smart Card was introduced in 2010 for standardised health information management. |
| Transport | • Government's support for the application of new technology to traffic management to maximise road network capacity and enhance road safety.<br>• Government's effort to combat vehicle exhaust gases and smoke. |

## Buildings & Environment
## Building Automation System (BAS)

#1 opportunity

| | |
|---|---|
| **Key Challenge** | • Integration and harmonisation of product and system design are still lacking.<br>• Price competition is high with low differentiation level among market participants. |
| **Programme** | • The increasing energy costs and focus on energy efficiency have resulted in increasing awareness.<br>• BAS technology advancement and acceptance level is high in Hong Kong. |
| **Smart Element** | • The increase in flexibility, performance and efficiency allows better control and monitoring of the system. Intelligent building system technology allows for integration with traditional stand-alone systems. |
| **Opportunity** | • **Large number of high rise buildings with high possibility of retro-fitting.**<br>• **High acceptance and demand for integration of building systems, partly fuelled by maturity in facilities management.** |
| **Main stakeholder** | • Building Owners and Managers Association (BOMA). |

| Timelines | Size | Technology |
|---|---|---|
| Mid term | Medium | Low to medium |

## Buildings & Environment
## Smart energy saving technologies

#2 opportunity

| | |
|---|---|
| **Key Challenge** | • Key end users consist of government facilities, with limited but growing application from high-end projects including offices, hospitals, and residential facilities.<br>• The energy efficiency building code is on a voluntary basis. |
| **Programme** | • Building Energy Codes (BECs) stipulate the minimum energy performance standards of installations of electricity, lighting, HVAC, and lifts. Up to October 2011, 2966 BECs registration certificates were issued to 1299 buildings that meet the BECs standards. |
| **Smart Element** | • A shift from airside heat recovery to water-cooled heat recovery devices witnessed in the industry due to the support of government and the ability of water-cooled chillers to save 30% more electricity than air-cooled chillers and have an output ratio nine times that of air-cooled chillers. |
| **Opportunity** | • **UK companies are currently enjoying a significant foothold in heat pipe market in Hong Kong. In the heat wheels market, AAF – an UK company, is one of the popular brands in Hong Kong. Other Opportunities in BMS, district cooling system, energy metering, timer control for FCU, high efficiency lighting, day light and motion control, $CO_2$ sensor, heat recovery system.** |
| **Main stakeholder** | • Electrical and Mechanical Services Department's Energy Efficiency Office (EEO). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to mid term | Small to medium | Low to medium |

## Digital Media
## 4G Network Deployment

#3 opportunity

| | |
|---|---|
| Key Challenge | • The Hong Kong telecommunications market faces pressure as revenues are decreasing due to market saturation and too much competition. Therefore the market's mobile operators are launching 4G services to open new business opportunities. |
| Programme | • The government plans calls for 70% of households and businesses to be connected to a high-speed LTE network by 2013. The service already has 700,000 subscribers. |
| Smart Element | • Having high-speed broadband wireless connections in nearly every premise will allow for future smart applications such as telematics, telecommuting and connected home applications to work more efficiently. |
| Opportunity | • **High speed and large capacity network service enable many services. This case is specifically mobile service. The opportunity would be music, video download/ streaming as well as online games on mobile phone/portable devices.** |
| Main stakeholder | • Office of Telecommunication Authority (OFTA).<br>• Top 5 mobile operators: Hutchison (3); CSL; PCCW Mobile; SmarTone; China Mobile. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Low |

## Education
## e-Learning in Schools

#4 opportunity

| | |
|---|---|
| Key Challenge | • Continuous increase in prices and frequent revisions of textbooks impose a great financial burden to parents and have become a public concern.<br>• Adoption of IT varies among schools. |
| Programme | • Three-year pilot scheme on "Promoting e-Learning" launched in 20 to 30 schools in the 2010/2011 school year.<br>• Post trials e-learning will be implemented across HK. |
| Smart Element | • Develop a depository of curriculum-based learning and teaching resources to provide a wide variety of digital resources for teachers to choose from.<br>• Enhance students' ability for self-learning and interactive learning. |
| Opportunity | • **Development of e-textbooks and alternative e-Learning resources for students.**<br>• **Training programmes to enhance teacher's IT pedagogical skills in adopting e-learning in schools.** |
| Main stakeholder | • Education Bureau. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Medium |

## Energy
## CLP Power Smart Grid Plan

#5 opportunity

| | |
|---|---|
| Key Challenge | • Hong Kong needs an interactive and comprehensive solution to tackle the multiple challenges of interconnecting renewable energy to the grid, maintaining and enhancing grid reliability, increasing customer interaction. |
| Programme | • CLP Power has established a smart grid plan for Hong Kong. CLP Power has also opened a Smart Grid experience centre in Hong Kong to demonstrate its projects for different elements of smart grids and increase public awareness for smart grid. |
| Smart Element | • Renewable energy, transmission and distribution management, green and smart living through better control of demand, and enabling the grid to integrate technologies such as EV, AMI and Demand response. |
| Opportunity | • **Opportunity for Smart Grid solution providers and system integrators.** |
| Main stakeholder | • CLP Power. |

| Timelines | Size | Technology |
|---|---|---|
| Long term | Medium | High |

## Health
## Integrated Health Information System Across Hong Kong

#6 opportunity

| | |
|---|---|
| Key Challenge | • To create a system of integrated care that allows integration of information across the whole healthcare industry.<br>• To improve management of chronic diseases, reduce test duplication, better patient care and reduce fraud cases in medical insurance claims. |
| Programme | • Smart Card for Health Information.<br>• Personal Health Record Program. |
| Smart Element | • Integration of health record through extensive ICT infrastructure will lay path for other smart applications. |
| Opportunity | • **National Health Smart Card Applications that integrates personal health records, diagnostic test results, insurance claim history and drug prescription history.** |
| Main stakeholder | • Research universities (University of Hong Kong, Hong Kong Baptist University, Hong Kong Polytechnic University), medical device R&D companies (Philips, GE, IBM), Hospital Authority of Hong Kong, Hong Kong Computer Society. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Medium |

## Health
## Telehomecare

#7 opportunity

| | |
|---|---|
| Key Challenge | • Ageing population that demand mobile technology solutions for the elderly, especially in cases where patients are immobilised. |
| Programme | • Telehomecare implementation and usage of smart medical devices. |
| Smart Element | • Home / Community-based care that includes assistive technology that is elder-care enabled to foster independent living.<br>• Chronic disease management for remote monitoring of patients.<br>• Integration of care through telemedicine. |
| Opportunity | • **Remote patient monitoring, telehealth, telemedicine, smartphone applications, assisted living technologies.** |
| Main stakeholder | • Hospital Authority and Chinese University of Hong Kong. |

| Timelines | Size | Technology |
|---|---|---|
| Mid to long term | Medium | Medium to high |

## Transport
## Extension of Railway Network

#8 opportunity

| | |
|---|---|
| Key Challenge | • Further improve Hong Kong's already high public transport usage.<br>• Encourage people to shift from bus to rail. |
| Programme | • Four railway projects are under construction (West Island Line and Hong Kong section of Guangzhou-Shenzhen-Hong Kong Express Rail Link, South Island Line (East), and Kwun Tong Line Extension.<br>• Five railway projects in design stage or under review. |
| Smart Element | • Rail management system to control and coordinate new lines with existing network, ensuring seamless connectivity among different transport modes. |
| Opportunity | • **Rail management system, IT infrastructure within stations and trains.**<br>• **Journey planner for passengers & Transport interchange infrastructure.**<br>• **Sustainable railway design including signalling, main control systems, environmental control system and traction energy system.** |
| Main stakeholder | • Transport Department. |

| Timelines | Size | Technology |
|---|---|---|
| Medium to long term | Large | Advanced |

# Transport
## Green Technology: Electric Vehicles

#9 opportunity

| | |
|---|---|
| **Key Challenge** | • Changing public perception that air pollution is mainly contributed by factories in mainland China, instead of being generated locally, and roadside pollution is largely caused by diesel vehicles and second-hand vehicles. |
| **Programme** | • Pilot Green Transport Fund encourages public transport sector to test out green and low-carbon transport technologies; Waiver of First Registration Tax on electric vehicles has been extended till March 2014. |
| **Smart Element** | • Better fuel economy, lower carbon emission and reduce roadside pollution.<br>• Electric vehicle.<br>• Hybrid vehicles for fuel efficiency and cleaner environment. |
| Opportunity | • **EV infrastructure development, marketing strategies to promote green technology, improvement of EV performance, features and designs to better match Hong Kong user preferences.**<br>• **Hybrid buses and Electric public buses for point-to-point short distance commuting.** |
| **Main stakeholder** | • Transport Department. |

| Timelines | Size | Technology |
|---|---|---|
| Mid to long term | High | Medium to high |

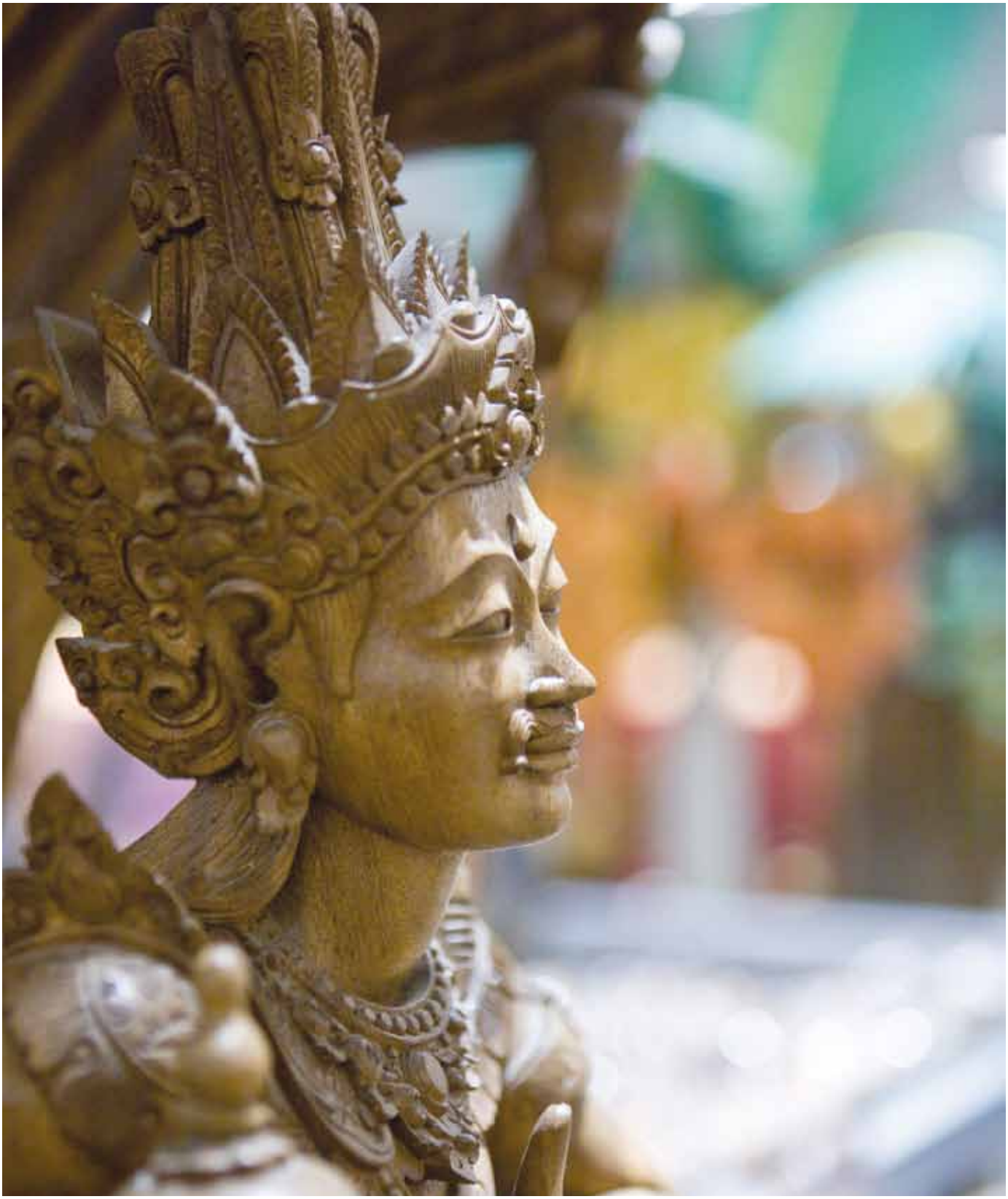
# Current and Future Smart Integration

| | Remarks | Level |
|---|---|---|
| Macro Environment | • A densely-populated city with 7.1 million inhabitants and expected to grow to 7.5 million by 2016.<br>• Developed economy with GPD per capita at USD 31,590. | |
| Smart Opportunity | • Very open for foreign investments and capabilities.<br>• Several smart initiatives are on-going at city level with strong government support. | |
| Fit with Capability | • Driven by the range of government activities to date, the most advanced smart technologies and solutions would fit in Hong Kong.<br>• Severe competition with international companies. | |
| Timeframe | • Several smart city projects are on going and new initiatives will be expected in short term.<br>• New technologies and solutions can be expected in near future. | |
| Overall Attractiveness | • Opportunities would be high in Hong Kong as many projects are on-going and similar level of smart solutions can be applied to Hong Kong. | |

# Summary of Hot Spots by Theme

| Theme | Current status | Smart outlook | Timeframe |
|---|---|---|---|
| Buildings & Environment | The city witnesses an influx of multinational companies bringing in building technologies. | Building systems focus on cost efficiency and high performance would be high in demand. | Medium |
| Digital Media | Mobile Penetration > 200%, household broadband penetration > 85%. | The city has substantial fibre optic coverage while 4G service started in late 2011. | Immediate |
| Education | Adoption of IT varies among schools. | Further promotion of e-Learning and enhancement of teacher's IT pedagogical skills.<br>Introduction of e-Textbooks. | Immediate |
| Energy | Establishment of a Smart Grid Roadmap. | CLP Power is expected to start smart grid demonstration projects. | Medium to long run |
| Health | Standardisation of eHealth on medical records. | Adoption of Integrated Health Information System and remote monitoring devices for the silver market. | Immediate to long term |
| Transport | Increasing traffic congestion and high levels of roadside pollution. | Use of intelligent transport systems and green technology vehicles. | Immediate |

# Indonesia



# Indonesia

**P45 Context**

Demographic and Macro Economic Context
Principal Challenges
Smart Solutions

**P47 Opportunities**

Buildings and Environment
Digital Media
Education
Energy
Health
Transport

**P54 Current and Future Smart Integration**

**P55 Summary of Hot Spots by Theme**

## Key:

This key explains the broad parameters that were used in calculating the relative timeline, size, and technology levels deployed per each opportunity that follows:

| Timelines | Size | Technology |
|---|---|---|
| **Immediate**<br>Less than 18 months | **Small**<br>Less than £50 million | **Low**<br>Existing/proven technology |
| **Mid term**<br>18 months to 3 years | **Medium**<br>£51 million to £200 million | **Medium**<br>Technology in introduction |
| **Long term**<br>Over 3 years | **Large**<br>Over £200 million | **High**<br>Technology to be introduced |

**UKTI Contact in Indonesia:**
Debbie Clarke
Director of UK Trade & Investment
Debbie.Clarke2@fco.gsi.gov.uk

# Demographic and Macro Economic Context

**Brief Overview of Jakarta**

- Jakarta is the capital city of Indonesia, an archipelago of over 17,000 islands. It is located on the island of Java which covers some 250 square miles and houses almost two thirds of Indonesia's vast population of over 240 million. Java is divided into 6 municipal regions (North, South, West, East, Central and 1000 Islands), each with their own autonomy.
- It is a bustling city of around 9.5 million people which rises to over 13 million when you include the other satellite cities which make up 'Greater Jakarta' (Jakarta, Bogor, Tangerang, Depok and Bekasi) placing it among the top ten largest cities in the world by population.
- The city is Indonesia's centre of economic and political focus but a growing population and urbanisation has brought Jakarta its own complexities and problems as it develops faster than its infrastructure can keep pace with, particularly around the transport sector.
- The Indonesian Government's Economic Master-plan will see an expected investment of around £304 billion, much of it on development of infrastructure particularly within Jakarta, opening up opportunities for UK business in many areas.

## Demographic Profile

- Current population of central Jakarta is around 9.5 million, growing around 1.4% annually since 2000.
- 5.4 million commuters visit Jakarta daily from surrounding satellite cities adding to an already crowded city.
- Ethnic groups (based on census in 2000): 45% Javanese, 14% Sundanese, 7.5% Madurese & 26% other ethnic groups.
- 72% of the population are actively working.
- 47% of the population of Jakarta have smart phones with Indonesians the world's largest users of twitter and second largest users of Face Book.
- Growing affluent and aspirational middle-class in Indonesia (mostly centred in Jakarta) estimated to be at least 45 million - equivalent to a substantial country on its own (i.e. larger than the population of Malaysia or Australia). It's middle-class is larger than India's.

## Economic Profile

- GDP per capita in Jakarta was $3,469 in 2011.
- Annual growth rate is rapidly increasing between 5-7% in recent years. For 2011 it id estimated to be around 6.5%.
- 65% of GDP is contributed by 3 main themes: Financial and business services (28%), trading & hotel/restaurants (21%) and manufacturing (16%).
- Indonesia has recovered its investment grade status by Fitch after 14 years with two other ratings agencies set to follow. This reflects Indonesia's strong and resilient economic growth.
- Indonesia is projected to be the 5th largest economy in the world by 2030.

## Principal Challenges

| | |
|---|---|
| Buildings & Environment | • Green development agenda at the infancy stage. Lack of real policy and regulation at Government level to drive this forward and obtaining 'buy in' from companies who need convincing on costs.<br>• Deemed as unnecessary cost by companies. |
| Digital Media | • Broadband penetration is extremely low, and with a GDP per capita of roughly USD 3,000 the affordability of smart services is a major barrier to adoption. |
| Education | • Low education budget of which teachers salary accounts for 80%.<br>• Low level of development compared to neighbouring countries. |
| Energy | • Greater and reliable access to power has a higher priority over smart solutions.<br>• Current policies subsidise fossil fuels, politically challenging to move away from.<br>• Bureaucracy and lack of policy framework could delay the implementation of smart solutions in the energy sector. |
| Health | • Inadequate maternal/infant healthcare and geographic limitations.<br>• Inadequate healthcare delivery in rural areas especially the small islands. |
| Transport | • Poor road infrastructure creates continuous acute traffic congestion in Jakarta. Road development in the city has been unable to keep pace with the growth in cars and motorcycles.<br>• Heavy congestion impacts on other businesses such as logistics. |

## Smart Solutions

| | |
|---|---|
| Buildings & Environment | • Three important factors which will play a major role in the development of the built environment are Indonesia's promotion to investment grade status (by Fitch), real estate foreign ownership reform and the new Land Acquisition bill which has been passed by the House of Representatives.<br>• The Indonesian Government, through the Ministry of Public works, is working to develop policy and regulation to support the implementation of sustainable construction. There is also increasing support from property developers to drive forward the green development agenda. |
| Digital Media | • Despite a low income and limited broadband penetration, the ubiquity of mobile services are causing new industries to develop such as mobile payments and social networking services (Indonesia is the world's largest market for Facebook). |
| Education | • 2010-2015 Strategic Plans of Ministry of Education as the platform of all education programs.<br>• Demand has been shifting toward online programs. |
| Energy | • Government's fast track plan for power development aims to increase the share of renewable energy in the fuel mix from 7% currently to almost 17% by 2025. Smart grid would be required to integrate this renewable energy to the grid. |
| Health | • External funding to develop smart solutions in rural areas.<br>• Funding from international organizations and local adoption will continue to drive growth in line with infrastructure development. |
| Transport | • Government has created blueprint for an integrated multi-mode mass transport for 2030, detailed to Jakarta City Transport master plan, involving public buses, railways, waterways, and subways. |

## Buildings & Environment

# Rooftop landscaping: A sustainable way to increase Jakarta's Green Open Areas (GOA)

#10 opportunity

| | |
|---|---|
| **Key Challenge** | • The concept of rooftop landscaping is relatively new in Jakarta, and is still perceived as an attraction or beautifying tool on buildings.<br>• Very little awareness of rooftop landscaping for the purpose of being sustainable. |
| **Programme** | • In 2007, the city promised a green face-lift in line with the 2010-2030 spatial masterplan, which aims to modernize Jakarta's landscape for the next two decades, with one of its targets being an increase in open green spaces from 9.3 percent to 30 percent. |
| **Smart Element** | • Expansion of green space on the roofs of buildings proved capable of lowering the temperature of the city, absorb pollutant gasses, reduce the heat island and solar radiation, and reduce noise level. |
| **Opportunity** | • **Architectural consultancy on roof structure, in terms of withstanding additional burden, anti-leak bottom layer, network of underground water channels, soil media layer, median planting, cover crops, rainwater harvesting system.** |
| **Main stakeholder** | • Jakarta City Park Agency, Jakarta City Planning Agency, Jakarta Public work Agency, Jakarta Agricultural Agency, Jakarta Regional Environment Impact Analysis Board. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to long term | Small due to initial stage | Low |

## Buildings & Environment

# Green Integrated Facilities Management (GIFM): Potent subsector due to emerging green building market

#11 opportunity

| | |
|---|---|
| **Key Challenge** | • The concept of IFM in Indonesia is at nascent stage with contracts mainly from banks and financial services sector. FM services, in most cases, are looked upon as routine services that offer no value-added. |
| **Programme** | • The development of Green Building Council Indonesia (GBCI) in early 2010 has spurred interest among stakeholders. |
| **Smart Element** | • GIFM services can reduce the running cost of a building by promoting efficient management of water, energy and other resources. Improved indoor environment reduces health related problems. |
| **Opportunity** | • **Information technology tools to monitor HVAC, lighting, elevators, security, carbon emission control systems, green building consultancy, green energy consultancy, eco-friendly cleaning chemicals and products.** |
| **Main stakeholder** | • Green Building Council Indonesia (GBCI).<br>• Jakarta Building and Monitoring Agency.<br>• Major developers. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to long term | Medium | Medium |

## Buildings & Environment
## Waste Management System

#12 opportunity

| | |
|---|---|
| Key Challenge | • Increasing amount of wastage due to increasing city population (current volume ± 6,500 tons per day).<br>• Limited fund and land allocation for waste treatment facility plants. |
| Programme | • Integrated waste management master plan 2012 – 2032.<br>• Building more Intermediate Treatment Facilities with higher capacity.<br>• 3R (Reduce, Reuse, Recycle) concept: 3R centres across Jakarta, involving public education, an green technology adoption, with a goal of 'zero-to-waste'. |
| Smart Element | • Long term environmental impact: healthy, cleaner and well managed environment with high recycling rates, which will reduce emissions, and work as an alternative power generator. |
| Opportunity | • **Technology and system support on waste treatment management, such as recycling technologies, waste treatment facility management systems.** |
| Main stakeholder | • Ministry of Public Works.<br>• Jakarta Regional Government – Sanitary Official Agency. |

| Timelines | Size | Technology |
|---|---|---|
| Medium to long term | Medium to large | Low to medium |

## Digital Media
## 4G

#13 opportunity

| | |
|---|---|
| Key Challenge | • Technical issues such as frequency, regulation and infrastructure.<br>• Government currently still focus on WiMax. |
| Programme | • Regulations under development.<br>• Technology is still under research and testing for real implementation by few technology providers. |
| Smart Element | • High speed network.<br>• Lower investment. |
| Opportunity | • **Infrastructure, e.g. Base Transmitter Stations.**<br>• **Supporting software.**<br>• **Refarming frequency (optional).** |
| Main stakeholder | • Service operators/ provider, i.e. Telkomsel, Nokia Siemens Network, XL, Alcatel Lucent Indonesia, etc. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to mid term | Large | Low to medium |

## Digital Media
## Telkomsel T-Cash

#14 opportunity

| | |
|---|---|
| Key Challenge | • Understanding that Indonesia has over 236 million people and a bank account penetration rate of less than 10%, Indonesia's largest mobile operator started a mobile payment service in 2010. |
| Programme | • T-Cash allows Indonesians to store money on their mobile phones and also make payments for several essential services including electricity payments. The service already has 4 million users and is expected to pass 8 million by the end of the year. |
| Smart Element | • By allowing Indonesians to use their phone as a bank account consumers can more efficiently pay bills and transfer money without paying exorbitant fees. |
| Opportunity | • **Mobile payments.** |
| Main stakeholder | • Telkomsel, utility providers. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Large | Low |

## Education
## E-book for primary level education

#15 opportunity

| | |
|---|---|
| Key Challenge | • On process to provide e-book for all subjects for primary education.<br>• Limited reliable internet connection at competitive prices.<br>• Limited number of schools with sufficient internet and computer facilities. |
| Programme | • Ministry of Education has provided e-book facility as part of affordable (cheap) book programme. |
| Smart Element | • E-book programme would decrease the money spent for purchasing text books.<br>• Schools have to be well connected to the internet to support this programme.. |
| Opportunity | • **Solutions for reliable internet connection.**<br>• **School computerisation.** |
| Main stakeholder | • Ministry of Education, Public schools, Local governments. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Medium |

## Education

### Remote Learning Open University

#16 opportunity

| | |
|---|---|
| **Key Challenge** | • Limited reliable internet connection at competitive prices.<br>• Has not yet fully imposed e-exam programme.<br>• Limited choices of bank correspondence for online payment facilities. |
| **Programme** | • University programme for diploma and master degree for some courses. |
| **Smart Element** | • Online based program which reduces physical cost. |
| **Opportunity** | • **E-exam system, reliable and affordable internet connection.** |
| **Main stakeholder** | • Ministry of Education, Indonesia Open University, internet providers. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Medium |

## Energy

### Increase of Renewable Energy in the Fuel Mix

#17 opportunity

| | |
|---|---|
| **Key Challenge** | • Low investment attractiveness level due to high initial investment and complexity in bureaucracy. Still in process of developing the most suitable policy to be implemented in Indonesia. |
| **Programme** | • To replace the usage of fossil fuel with renewable energy. |
| **Smart Element** | • Green and environmental friendly energy resources. |
| **Opportunity** | • **Research and technology vendors.**<br>• **Investors in the renewable energy sector.** |
| **Main stakeholder** | • Ministry of Energy, oil and power generation companies. |

| Timelines | Size | Technology |
|---|---|---|
| Long term | High | High |

## Energy
## Smart Grid Pilot project

#18 opportunity

| | |
|---|---|
| **Key Challenge** | • Small scale investment.<br>• Decision on the elements of smart grid which could be included in the pilot project in a feasible manner. |
| **Programme** | • PLN plans to undertake smart grid pilot projects in Jakarta, Batam and Bangka. |
| **Smart Element** | • The pilot project is still in assessment phase and could include all aspects of smart grid including distribution, generation or at the consumer level. |
| **Opportunity** | • **Opportunity for established smart grid technology vendors to enhance credibility in a relationship based Indonesian market.** |
| **Main stakeholder** | • PLN (government owned power utility). |

| Timelines | Size | Technology |
|---|---|---|
| Medium to long term | Small | Low |

## Health
## Mobile Telemedicine System

#19 opportunity

| | |
|---|---|
| **Key Challenge** | • Delivery of basic primary healthcare services to rural populations. |
| **Programme** | • Mobile Telemedicine System aims to train and provide incentives to health workers to attend to more remote areas and educate people on health and wellbeing. |
| **Smart Element** | • Mobile community based primary healthcare with basic remote sensing technologies.<br>• Integration of healthcare delivery through telemedicine. |
| **Opportunity** | • **Remote patient monitoring, telehealth, telemedicine and smartphone applications.** |
| **Main stakeholder** | • Bandung Institute of Technology. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Medium |

# Health
## Mobile Healthcare to Deliver Basic Midwifery Services

#20 opportunity

| | |
|---|---|
| Key Challenge | • Limited access to midwifery services in rural areas, particularly the remote small islands. |
| Programme | • Mobile Phone Programs for Midwives: Through mobile phones, mothers giving birth are expected to get expert assistance to diagnose problems quickly and determine which cases need to go to hospital immediately. |
| Smart Element | • Mobile community based primary healthcare with basic reporting systems.<br>• Integration with telemedicine and mhealth information technology.<br>• ICT for healthcare intervention applications in the future. |
| Opportunity | • **Remote patient monitoring, telehealth, telemedicine, SMS healthcare applications and smartphone applications.** |
| Main stakeholder | • World Vision.<br>• United Nations Children's Fund (UNICEF).<br>• United Nations Population Fund (UNFPA). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to mid term | Medium | Medium |

# Transport
## Mass Rapid Transit

#21 opportunity

| | |
|---|---|
| Key Challenge | • High investment for the technology and construction.<br>• Cost of land acquisition. |
| Programme | • The first phase of the Jakarta MRT project consists of 13 stations along a 15.2 km track from south to central Jakarta. Operations are expected to commence in 2016 with a target of 173,000 passengers. The second phase will consist of 7 stations along an 8km track from south to north Jakarta, operational by 2018. The east-west section, covering 87.7 km, is still at feasibility study stage with operation expected to commence around 2024/27. |
| Smart Element | • Mass transport capacity of up to 400,000 people per day by 2020.<br>• Reduce travel time by more than 50% & 0.7% CO2 emission reduction per year. |
| Opportunity | • **Financial investment / loan.**<br>• **Elevated & underground stations construction of phase II & III.**<br>• **Technical consultancies on supporting facilities.** |
| Main stakeholder | • PT Mass Rapid Transit Jakarta.<br>• Ministry of Transport.<br>• Jakarta Regional Planning Board (Bappeda). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Medium to advanced |

# Transport
## Integrated E-ticketing: Smart Mass Transit System

#22 opportunity

| | |
|---|---|
| **Key Challenge** | • Large scope: involving public buses and BRT, trains, and future MRT.<br>• Investment on hardware and software integration at a number of transport facilities.<br>• Product education and socialisation. |
| **Programme** | • Contactless smart card technology: prepaid feature, supporting hardware & software.<br>• Can be used at different modes of public transport. |
| **Smart Element** | • Reduce conventional ticket wastage & operational time.<br>• Integrated ticketing to support multi-mode city transport system. |
| **Opportunity** | • **Supporting facilities: hardware & software.**<br>• **Investment on facilities, operational and maintenance.** |
| **Main stakeholder** | • Ministry of Transport.<br>• Related transport service provider: PT KA (railways & commuter trains), BLU TransJakarta (BRT), PT MRT Jakarta (MRT), and other public bus providers. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to long term | Medium | Low |

# Transport
## ERP: 3-in-1 System Replacement

#23 opportunity

| | |
|---|---|
| **Key Challenge** | • Legal / Administration issues: regulation incompleteness.<br>• Time issues in planning and implementation. |
| **Programme** | • ERP system similar to the one implemented in Singapore or London.<br>• To replace current 3-in-1 system that is claimed to be ineffective at reducing traffic.<br>• Using smart card technology. |
| **Smart Element** | • Congestion charge.<br>• Additional income for government to improve other transport facilities. |
| **Opportunity** | • **ERP System: infrastructure hardware & software procurement.**<br>• **Consultancies: legal/ administration benchmark study.**<br>• **Investment tender.** |
| **Main stakeholder** | • Jakarta Transport Authorization Board (OTJ).<br>• Ministry of Transport. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to mid term | Medium | Low |

# Current and Future Smart Integration

| | Remarks | Level |
|---|---|---|
| Macro Environment | • 10th largest city in the world with a population of 9.5 million.<br>• Fast growing economy with GDP growth at 5-7% annually, but low per capita GDP at less than USD10,000. | |
| Smart Opportunity | • Smart solutions will be welcomed as Jakarta faces challenges to make the city smarter and to cope with a large population. | |
| Fit with Capability | • Existing or proven smart solutions by UK companies will fit the situations in Jakarta.<br>• Connection with the government agencies will be required. | |
| Timeframe | • Several smart initiatives are in the pipeline.<br>• Projects tend to delay due to budget restraint and political issues. | |
| Overall Attractiveness | • Huge population of Indonesia with more than 200 million people.<br>• Smart solutions expected due to low technology adaptation and increasing city issues such as traffic congestion. | |

# Summary of Hot Spots by Theme

| Theme | Current status | Smart outlook | Timeframe |
|---|---|---|---|
| Buildings & Environment | The introduction of both rooftop landscaping and Green Integrated Facilities Management concepts has occurred recently. | Increasing involvement of public sector. | Immediate to long term |
| Digital Media | Mobile Penetration > 70%, household broadband penetration >10%. | 4G wireless networks should be deployed by 2013 creating more opportunities. | Mid to long term |
| Education | Current education programme still focuses on the conventional approach. | Stakeholders are pushed to move towards online programmes. | Immediate to mid term |
| Energy | Highly depends on fossil-fuel energy. | Renewable development in hydro, solar, biofuels, small scale wind and wave.<br>Emission reduction program. | Mid to long term |
| Health | Development of basic infrastructure to deliver healthcare services to rural areas. | More comprehensive telemedicine applications. | Immediate to long term |
| Transport | BRT & Commuter trains, private & public transport.<br>Authorisation & regulation under-development. | Integrated public mass transport system.<br>Integrated e-ticket (smart card).<br>Emission reduction program. | Immediate to long term |

# Japan

# Japan

**P58 Context**

Demographic and Macro Economic Context
Principal Challenges
Smart Solutions

**P60 Opportunities**

Buildings and Environment
Digital Media
Education
Energy
Health
Transport

**P66 Current and Future Smart Integration**

**P67 Summary of Hot Spots by Theme**

**P68 Smart City Projects in Other Cities in Japan**

## Key:

This key explains the broad parameters that were used in calculating the relative timeline, size, and technology levels deployed per each opportunity that follows:

| Timelines | Size | Technology |
|---|---|---|
| **Immediate**<br>Less than 18 months | **Small**<br>Less than £50 million | **Low**<br>Existing/proven technology |
| **Mid term**<br>18 months to 3 years | **Medium**<br>£51 million to £200 million | **Medium**<br>Technology in introduction |
| **Long term**<br>Over 3 years | **Large**<br>Over £200 million | **High**<br>Technology to be introduced |

**UKTI Contact in Japan:**
Richard Buttrey
Head of Trade & Investment
Richard.Buttrey@fco.gsi.gov.uk

**www.ukti.gov.uk/japan**

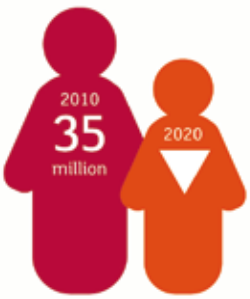
# Demographic and Macro Economic Context

**Brief Overview of Tokyo**

- Tokyo is the capital of Japan that is the world's 3rd largest economy, following the USA and China with nominal GDP of $5.4 trillion in 2010.
- Tokyo is one of the 47 prefectures in Japan. Greater Tokyo consists of 4 prefectures and is the largest mega city in the world in terms of economy and population with 35 million residents.
- Tokyo is a centre of finance, culture, food and fashion.
- Most of the urban area in Greater Tokyo is concentrated in the Tokyo Bay Area. Many people live in the outer part of Greater Tokyo and commute to the urban area.
- Tokyo is the largest of several major economic centres around Japan, including cities like Osaka, Nagoya, Sapporo, Kyoto and Fukuoka. Many of these share the same challenges and present the same 'smart' opportunities as the capital.

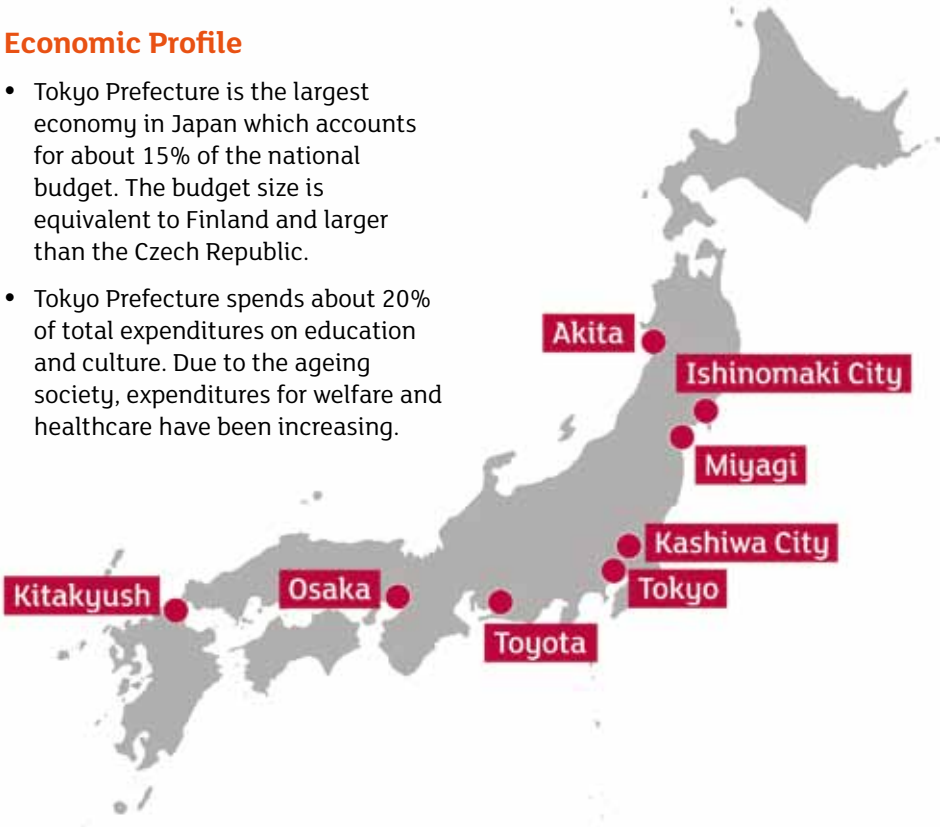
## Demographic Profile

- Population is 35 million in Greater Tokyo and 13 million in Tokyo Prefecture. The population is expected to reduce from around 2020.
- Population is rapidly ageing in Tokyo due to increased longevity and decreasing birth rates. 65 years old or older accounted for 20% of the population in 2009 and will increase to 27% in 2020.




## Economic Profile

- Tokyo Prefecture is the largest economy in Japan which accounts for about 15% of the national budget. The budget size is equivalent to Finland and larger than the Czech Republic.
- Tokyo Prefecture spends about 20% of total expenditures on education and culture. Due to the ageing society, expenditures for welfare and healthcare have been increasing.



## Principal Challenges

| | |
|---|---|
| Buildings & Environment | • The after effect of the March 2011 earthquake near Tokyo may not be as forceful as on other cities or provinces. Many reconstruction projects are not expected to take place immediately. |
| Digital Media | • Tokyo has an extremely sophisticated communications market, but the sector is dominated by local companies who are relatively hesitant to contract foreign companies. |
| Education | • It is critical to educate students to be successful globally.<br>• Number of students has been decreasing due to reducing child population. Competition among universities to get students is increasing. |
| Energy | • Need to look for alternate safer sources of energy in wake of nuclear disaster.<br>• Prepare the grid to enable integration of cutting edge technologies such as electric vehicles. |
| Health | • Heavy usage of medical services and rising demand on long-term medical care. Japanese people use medical services more frequently compared to other countries. The number of elderly people who need long-term care is rapidly increasing, particularly for people aged 75 years old and older. |
| Transport | • Congestion in trains has been improving but is still much more congested than other major global cities such as London and New York.<br>• High costs for car ownership due to expensive parking. |

## Smart Solutions

| | |
|---|---|
| Buildings & Environment | • Strong regulatory body support, constantly collaborating with other developed countries for exchange of knowledge.<br>• The reconstruction market after the March 2011 earthquake provides an appropriate timing for introducing building-related technologies. |
| Digital Media | • Japan has the highest mobile broadband penetration rate in the world next to South Korea, and nearly all homes have high-speed broadband access. The presence of major manufacturers such as NEC, Toshiba and Fujitsu facilitate the development of smart solutions in the country. |
| Education | • Universities and special schools which have unique curricula and features.<br>• Distance learning or virtual universities which do not restrict students geographically. |
| Energy | • Mature energy infrastructure which is well positioned for integration of advanced technologies and modernisation. |
| Health | • Healthcare smart solutions is made available through its world-class healthcare infrastructure with extensive innovations in engineering and ICT. With the backing of academia and industry heavyweights it aims to present a smart city model leveraging on robotics and telemedicine. |
| Transport | • Car sharing which provides car usage without owing cars.<br>• Intelligent Transport System (ITS) which makes transport more seamless and less stressful. |

## Buildings & Environment
## Energy Management System (EMS)

#24 opportunity

| | |
|---|---|
| **Key Challenge** | • High cost and limitation on knowledge associated with systems and various devices.<br>• Limitation on flexibility of the systems for future inclusion of smart appliances, meter, and control devices. |
| **Programme** | • EMS is one of the 21 technologies that are being promoted by the "Cool Earth" program – Japan's initiative to enhance energy efficiency to meet its greenhouse gas emission reduction targets. |
| **Smart Element** | • Technology advancement in storage systems.<br>• Regulatory bodies are establishing a new smart community social system that facilitates the effective use of electricity and heat energy. |
| **Opportunity** | • **Energy Display Systems, energy Control Systems, research and field tests on optimisation of household energy management.**<br>• **UK and Japan have been collaborating and participating in programs on heat-pumps and home energy systems.** |
| **Main stakeholder** | • New Energy and Industrial Technology Development Organization, Japan (NEDO).<br>• Major developers and building contractors. |

| Timelines | Size | Technology |
|---|---|---|
| Medium to long term | Large | Medium to high |

## Buildings & Environment
## Green Roof System: against urban heat island effect

#25 opportunity

| | |
|---|---|
| **Key Challenge** | • Difficult to make any improvement or impression in terms of level of innovation and technology breakthrough as the market has relatively strong technology and experience on green roof development. |
| **Programme** | • Green Tokyo Plan, an continuous from Tokyo Plan 2000, aims to have 1,200 hectares of rooftop and other greenery by 2015. |
| **Smart Element** | • Mitigating the heat island phenomenon; serving as a greenery dam to temporarily store rainwater; easing air pollution; preventing global warming; softening a barren urban landscape; and supporting the existence of various living creatures. |
| **Opportunity** | • **Opportunities arising in other cities in Japan, that are considering similar measures.**<br>• **UK and Japan have been using Landscape Research, Development and Construction Society (FFL)'s Guidelines for the planning, execution and upkeep of green roof sites as guidance standard.** |
| **Main stakeholder** | • Planning Section, Natural Environment Division, Tokyo Metropolitan Government. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to mid term | Small to medium | Low to medium |

# Digital Media
## 4G Network Deployment

#26 opportunity

| | |
|---|---|
| Key Challenge | • The Japanese telecommunications market faces pressure as revenues are decreasing due to market saturation. Therefore the market's mobile operators are launching 4G services to open new business opportunities. |
| Programme | • The government plans calls for 40% of households and businesses to be connected to a high-speed LTE network by 2012. The service already has 600,000 subscribers. |
| Smart Element | • Having high-speed broadband wireless connections in nearly every premise in Tokyo will allow for future smart applications such as telematics, telecommuting and connected home applications to work more efficiently. |
| Opportunity | • **Telematics, remote monitoring, telehealth, telecommuting, connected home.** |
| Main stakeholder | • Japanese government; NTT DoCoMo. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Large | Low |

# Digital Media
## Cloud Computing

#27 opportunity

| | |
|---|---|
| Key Challenge | • As captured from the March 2011 disaster in Japan, there is an urgent need to make communities and businesses safer and more resilient from the devastating impact of natural disasters. |
| Programme | • Cloud computing. |
| Smart Element | • Cloud-based architecture for delivery of medical, education, agriculture and other services. |
| Opportunity | • **R&D cooperation for technology exchange, cyber security, broadband and smart grid development; cloud based services in the public sector.** |
| Main stakeholder | • Multinational IT companies, small- and medium-sized companies, venture companies, Ministry of Economy, Trade and Industry. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Large | Low |

## Education

# Open University of Japan provides distance learning

#28 opportunity

| | |
|---|---|
| **Key Challenge** | • Some universities have difficulties to secure enough students.<br>• Employed or retired people have difficulties because the universities are not near their office or home. |
| **Programme** | • Open University of Japan is focusing on distance learning which enables people to study their preferred subjects anywhere they live. |
| **Smart Element** | • Distance learning provides opportunities to study anywhere they live.<br>• Variety of courses from university and master degree courses, qualification certificate and lifelong study. |
| **Opportunity** | • **Provide courses which can be broadcasted from UK.**<br>• **Provide facilities and e-learning systems to improve interactivity for distance learning.** |
| **Main stakeholder** | • The Open University of Japan.<br>• Ministry of Education, Culture, Sports, Science and Technology (MEXT). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Small | Low |

## Education

# Eco School promotes environmentally friendly school facilities

#29 opportunity

| | |
|---|---|
| **Key Challenge** | • Environment and ecology are the key elements for sustainable society.<br>• It is important for school children to learn about environment and ecology not only in classes but also from the school itself. |
| **Programme** | • Eco School considers environmental aspects in several area in terms of facilities, operations and education. |
| **Smart Element** | • Environmentally friendly facilities which use environmentally friendly materials.<br>• Efficient usage of facilities which can be used for a long time and use natural energies. |
| **Opportunity** | • **Provide school facilities which use environmentally friendly materials, are safe for health and last long.**<br>• **Provide programme to teach children about the environment by using facilities.** |
| **Main stakeholder** | • Ministry of Education, Culture, Sports, Science and Technology (MEXT), Ministry of Agriculture, Forestry and Fisheries (MAFF), Ministry of Economy, Trade and Industry (METI), Ministry of Environment (MOE). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Low |

## Energy
## Smart Meter Management

#30 opportunity

| | |
|---|---|
| Key Challenge | • Modernisation of grid to prepare it for integrating smart solutions such as electric vehicles, demand response, improved reliability etc. |
| Programme | • Utilities in Japan plan to provide about 1 million households with smart meters by 2012. The plan is part of the overall goal to equip about 50 million households with smart meters by 2020.<br>• Reform of energy markets and improving the resilience of the grid are possible future developments. |
| Smart Element | • Smart Meter installation would allow households to manage and use their electricity better.<br>• Advanced Grid management systems required to manage intermittent sources of renewable energy and to improve efficiency of the whole system. |
| Opportunity | • **Opportunity for smart meter and communication technology suppliers.**<br>• **Near Term opportunity: 1 million smart meters by 2012.**<br>• **Long term opportunity: 50 million smart meters by 2020.**<br>• **Installation of small and large-scale batteries and other energy storage systems for peak levelling; control systems for demand-side management; replacement of some grid infrastructure for bi-directional power.** |
| Main stakeholder | • Different utilities in Japan: TEPCO, Kansai Electric Power Company, Chubu Electric Power Company.<br>• ICT companies including Toshiba, Panasonic, and Fujitsu. |

| Timelines | Size | Technology |
|---|---|---|
| Medium | Large | High |

## Health
## Healthcare Consumer-Based Robotics

#31 opportunity

| | |
|---|---|
| Key Challenge | • Significant increase in elderly patients utilising healthcare infrastructure, with simultaneous declining young workforce. |
| Programme | • Consumer robotics for home-care applications. Mechanical helpers used in homes, offices, hospitals, and nursing facilities. |
| Smart Element | • Integration of robotic engineering and home care for the elderly. |
| Opportunity | • **Service robots in healthcare application for the silver market.** |
| Main stakeholder | • Ministry of Health, Ministry of Economy, Hospitals, National Institute of Advanced Industrial Science and Technology, Toyota, Honda and Panasonic. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to mid term | High | High |

## Health
## Telehomecare – Extension of Telemedicine Applications

#32 opportunity

| | |
|---|---|
| Key Challenge | • An ageing population, with an increase in immobility, creating demand for solutions to these issues. |
| Programme | • Telehomecare implementation and usage of smart medical devices. |
| Smart Element | • Home / Community-based care that includes assistive technology that is elder-care enabled to foster independent living.<br>• Chronic disease management for remote monitoring of patients.<br>• Integration of care through telemedicine. |
| Opportunity | • **Remote patient monitoring, telehealth, telemedicine, smartphone applications, assisted living technologies.** |
| Main stakeholder | • Ministry of Health, Japan Telemedicine and Telecare Association, Universities e.g. Tohoku University, Tottori University, Hiroshima University and Nara Medical University and major ICT companies. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to mid term | High | Medium to high |

## Transport
## IEV Car Sharing provides environmentally friendly mobility solution

#33 opportunity

| | |
|---|---|
| Key Challenge | • Owning a car in Tokyo is costly due to expensive parking space, and is not efficient as most people use cars mainly only on weekends and for short periods during the week.<br>• Conventional cars are not environmentally friendly. |
| Programme | • EV car sharing services will provide fully flexible car usage whilst eliminating car owning costs. Electric Vehicles (EV) are suitable for car sharing as people do not use car sharing services for long distance travel. |
| Smart Element | • Car sharing increases efficiency of vehicle usage.<br>• EVs emit no CO2 and the running cost is cheaper. |
| Opportunity | • **Car sharing systems such as vehicle management system and IC cards.**<br>• **EV and EV charging stations.**<br>• **EV car sharing related IT services such as location based services.** |
| Main stakeholder | • Private car sharing companies such as Careco and Orix.<br>• Tokyo Metropolitan Government and local city governments.<br>• Tokyo metropolitan Public Corporation for Road Improvement and Management. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Low to medium |

# Transport

## Smart Way (ITS Spot Services) unifies car navigation and ETC

#34 opportunity

| | |
|---|---|
| **Key Challenge** | • Vehicles equip multiple systems such as car navigation systems, telematics services and Electric Toll Collection (ETC) and those systems confuse drivers because the systems are not integrated. |
| **Programme** | • Smart Way, or ITS Spot Services, provides integrated ITS services by high speed and high capacity communication between ITS spots on road and car navigation systems. |
| **Smart Element** | • Intelligent Transport System (ITS).<br>• Electric Toll Collection (ETC).<br>• ITS Spot enabled car navigation systems. |
| **Opportunity** | • **Provide ITS spot services such as dynamic route guidance with real time traffic information, safety driving support and ETC.**<br>• **Provide both hardware and software such as ITS spots, ETC, navigation systems.** |
| **Main stakeholder** | • Ministry of Land, Infrastructure, Transport and Tourism (MLIT).<br>• Local prefectural and city governments. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Small to medium | Low to medium |

# Current and Future Smart Integration

| | Remarks | Level |
|---|---|---|
| Macro Environment | • Tokyo is the largest mega city in the world with 35 million residents. Japan is the 3rd largest economy in the world.<br>• Population will decrease and ageing has been proceeding rapidly. | |
| Smart Opportunity | • Many smart initiatives are happening not only in Tokyo but also other cities in Japan.<br>• Open for foreign investment but competition with local companies will be harsh. | |
| Fit with Capability | • The most advanced smart technologies and solutions can be tested and adopted, but Japanese companies may have more advanced smart technologies and solutions than UK companies have. | |
| Timeframe | • Many smart initiatives have already started but more smart initiatives are expected to come. | |
| Overall Attractiveness | • Opportunities would be high in Tokyo if UK companies have advanced smart technologies and solutions as Tokyo and other cities in Japan have many smart initiatives. | |

# Summary of Hot Spots by Theme

| Theme | Current status | Smart outlook | Timeframe |
|---|---|---|---|
| Buildings & Environment | Mature building technologies market. | Integration of smart energy management systems driven by deployment of smart grids. | Medium to long term |
| Digital Media | Mobile Penetration >100%, household broadband penetration > 90%. | 4G services should be commercialised in 2012. | Immediate |
| Education | Universities facing difficulties to secure enough students. | Distance learning covers wide range of people geographically. | Immediate |
| Energy | Maintaining high reliability and enable the interconnection of renewable energy to grid. | Adopt smart grid including multiple elements. | Medium |
| Health | World frontier of smart applications in healthcare leveraging ICT and engineering. | Advanced smart cities with advanced applications of robotics and telehomecare with remote sensing technologies. | Immediate to long term |
| Transport | Expensive car ownership.<br>Complicated IT technology in car. | EV car sharing.<br>Smart Way (ITS Spots Services). | Immediate to mid term |

# Smart City Projects in Other Cities in Japan

## Master Plan for Demonstration of Next Generation Energy and Social System in 4 Cities

### Project Overview

- Ministry of Economy, Trade and Industry (METI) announced the 5-year master plans for demonstration of Next Generation Energy and Social System in August 2010.
- Each of the 4 demonstration areas (Yokohama City, Toyota City, Kansai Science City and Kitakyushu City) has different initiatives to promote smart grid and demonstrate smart community.
- UK companies may participate in the projects to demonstrate their expertise.

### Yokohama City Kanagawa Pref.

- Yokohama City has a population of 3.7 million people.
- Plan to conduct large scale energy management with 4,000 households in 3 areas covering commercial, residential and industrial buildings.

### Toyota City Aichi Pref.

- Toyota City is a middle size city with 420,000 people.
- Aim to achieve over 60% self supply of energy requirements by installing solar power generation, fuel cells, heat pumps, storage batteries and next generation vehicles.

### Kansai Science City Kyoto Pref.

- Kansai Science City was developed as a national project in 1987 for new creative development.
- Plan to achieve more efficient energy use and maximise usage of renewable energy by connecting homes, buildings and EVs for exchanging data with power grid system.

### Kitakyushu City Fukuoka Pref.

- Kitakyushu City is located in Kyushu island with 974,000 population.
- Plan to conduct energy management that effectively use regional energy sources by producing energy from waste heat and hydrogen available at nearby factories.

# Smart City Projects in Other Cities in Japan

## Kashiwa-no-ha Campus City in Kashiwa City

### Project Overview

- Kashiwa-no-ha Campus City aims to be “smart city”, “healthy long-life city” and “new industry creation city”.
- The city was selected by Keidanren, or Japan Business Bureau, as “Future City Model Project” and implementing most advanced technologies, services and systems.

### Location

- Kashiwa City in Chiba Prefecture is a mid size city with 405,000 people which had grown as a commuter town of Tokyo.

### Main Stakeholder

- Kashiwa City, Chiba Prefecture, Tokyo University, Chiba University, Mitsui Fudosan.

### Opportunity

- Provide the most advanced technologies, services and systems in terms of energy, healthcare, building and education.

### Smart City

- Efficient usage of unused energy starting 2014.
- Set up Area Energy Management System (AEMS) for centralised electricity management.

### Healthy Long-Life City

- Tokyo University set up gerontology research centre to solve challenges in ageing society.
- Chemical-less Town target to reduce chemical allergies.

### New Industry Creation City

- Tokyo University sets up Future Centre to develop future business and research areas in 2013.
- Chiba University set up a plant factory to offer programmes.

# Smart City Projects in Other Cities in Japan

## Smart City/Community Projects in Tohoku Area devastated by the earthquakes

### Renewable Energy and IT for Agriculture

- Renewable Energy and IT for Agriculture.

### Smart City in Tohoku 3 Pref.

- Hitachi Ltd is proposing Miyagi, Fukushima and Iwate Prefectures to build smart cities in more than 10 cities in the prefectures.
- Several smart city elements such as energy, building, transport infrastructure.

### Smart Community in Miyagi

- Toyota Motor announced to start smart community concept “F-Grid concept” in Miyagi to promote efficient energy usage and renewable energy.
- Energy management, renewable energy, smart grid.

### Ishinomaki Reconstruction Project

- Ishinomaki City in Miyagi Pref. set up a reconstruction project by using new energy and efficiently using energy with Japan IBM, Tokyo Gas, Tohoku Power.
- Energy management, renewable energy.

### Information Integration Management

- Itochu and Japan IBM participate in smart city project promoted by Akita City, Akita Pref. to develop smart city concepts.
- Consulting on energy management and renewable energy.

# Malaysia

# Malaysia

**P73 Context**

Demographic and Macro Economic Context
Principal Challenges
Smart Solutions

**P75 Opportunities**

Buildings and Environment
Digital Media
Education
Energy
Health
Transport

**P82 Current and Future Smart Integration**

**P83 Summary of Hot Spots by Theme**

**P84 Smart City Projects in Other Cities in Malaysia**

## Key:

This key explains the broad parameters that were used in calculating the relative timeline, size, and technology levels deployed per each opportunity that follows:

| Timelines | Size | Technology |
|---|---|---|
| **Immediate**<br>Less than 18 months | **Small**<br>Less than £50 million | **Low**<br>Existing/proven technology |
| **Mid term**<br>18 months to 3 years | **Medium**<br>£51 million to £200 million | **Medium**<br>Technology in introduction |
| **Long term**<br>Over 3 years | **Large**<br>Over £200 million | **High**<br>Technology to be introduced |

**UKTI Contact in Malaysia:**
Tony Collingridge
Director of Trade & Investment
Tony.Collingridge@fco.gsi.gov.uk

**www.ukti.gov.uk/malaysia**

# Demographic and Macro Economic Context

**Brief Overview of Kuala Lumpur**

- Kuala Lumpur is the capital and the second largest city in Malaysia by population. The city, making up an area of 243 km$^2$, has a population of 1.6 million. Greater Kuala Lumpur, also known as the Klang Valley, is an urban agglomeration of 7.2 million. It is the fastest growing metropolitan region in the country, in terms of population and economy.
- The Greater Kuala Lumpur Strategic Development Project was proposed under the 10th Malaysian Plan to revitalise the city by re-developing various assets.
- The Land area of Kuala Lumpur itself is expected to increase from 243km$^2$ in 2000 to 279.3km$^2$ in 2020 due to the future development of new housing and commercial areas.

## Demographic Profile

- The population in Kuala Lumpur City Centre Center alone is currently at 1.6 million with an average annual grpwth rate of 2%.
- Average size per household is 4.6 people and is in a downward trend with a likely increase in the number of households.
- 51% of the employment is in the service sector followed by the manufacturing sector.
- A key challenge on social-demography will be the increasing number of immigrants and continuous loss of professionals migrating to other countries: creating an impact on the knowledge-economy base the country is trying to establish.

## Economic Profile

- Fastest growing region in Malaysia, and remains the economic & business centre of the country.
- The GDP for Kuala Lumpur is estimated at RM 73.5 billion (USD 24 billion) with an average annual growth rate of 5.9%, which contributes to 14% of total country's GDP. The per capita GDP for Kuala Lumpur is RM48,556 (USD 15,800).
- The professional services sector primarily the finance, business and insurance services generates the largest revenue (90%) in Kuala Lumpur followed by manufacturing (6%) and construction (4%).

## Principal Challenges

| | |
|---|---|
| Buildings & Environment | • Awareness on energy efficiency or incorporation of green or smart technologies has been weak.<br>• Lack of expertise or professionals. |
| Digital Media | • Broadband penetration remains low in the country due to a lack of competition in the fixed line space. |
| Education | • Made enormous strides achieving an adult literacy rate of 92%.<br>• Malaysia's student outcomes have fallen behind other countries. |
| Energy | • The key challenge facing the implementation of smart grid in Malaysia is establishment of commercial and technical viability by the national utility TNB. The feasibility assessment could potentially delay the adoption of smart grid in Malaysia. |
| Health | • Inefficient diagnostic services and ageing population. Distributed model of providing diagnostic services such as radiology and pathology across more than 130 public and 210 private hospitals needs to be improved. |
| Transport | • High congestion during peak hours on rail and road, unreliable service with frequent delays and cancellations, poor connectivity between modes, poor access to public transport services, high dependence on private transport. |

## Smart Solutions

| | |
|---|---|
| Buildings & Environment | • The government encourages acceleration of green building market growth through disbursement of tax benefits, stamp duty exemption, funding through Green Technology Financing Scheme (GTFS). |
| Digital Media | • Kuala Lumpur is very keen to stay competitive and drive its ICT initiatives such as the high speed broadband. Mobile broadband is also helping to make up for the lack of fixed-line infrastructure. |
| Education | • Strengthening the private education services sector by increasing private consumption and investments as well as expanding education exports. Would like to rebrand as a major education centre of choice and a pivotal hub in the global education network. |
| Energy | • TNB has developed a 25 year Electricity Technology Roadmap covering the period to 2030 aimed at modernizing Malaysia's electricity supply. Smart grid is expected to be one of the key ways to enable reliable, efficient and intelligent power and providing value added electricity products and services. |
| Health | • ICT infrastructure allows development of smart applications in diagnostic services. The rise of lifestyle diseases among senior citizens will create the need for outpatient care and senior living facilities. |
| Transport | • Green Technology Policy is a driver to accelerate the national economy and promote sustainable development in green technology vehicles which contribute better fuel economy, lower greenhouse emission and exhaust emissions. |

## Buildings & Environment
# Building Management System

#35 opportunity

| | |
|---|---|
| **Key Challenge** | • The higher cost associated with the implementation of controlling and monitoring system burdens building owners and tenants, and hence, results in low adoption rate. |
| **Programme** | • The government has taken the lead by the construction of Low Energy Office and Zero Energy Office, which are accommodated by government agencies. |
| **Smart Element** | • The Low Energy Office incorporates insulated walls, environment-friendly lighting, and renewable energy sources.<br>• The Zero Energy Office employs technologies such as photovoltaic systems. |
| **Opportunity** | • **Energy efficient HVAC system and lighting control, the use of high function lighting, ventilation and insulation materials, engagement of energy management system (EMS), building automation system (BAS).** |
| **Main stakeholder** | • Department of Public Works (JKR), Construction Industry Development Board (CIDM), Department of Town & Country Planning (JPBD), Malaysian Institute of Planners (MIP), Real Estate and Housing Developers Association (REHDA). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium to large | Low |

## Buildings & Environment
# Water efficiency: A shift from water-supply management to water demand management

#36 opportunity

| | |
|---|---|
| **Key Challenge** | • Lack of transparency, proper introduction and guidance of these policies have resulted in reduced impact on implementation of the water management policies. |
| **Programme** | • The reduction of water use by 20% through focusing on water efficiency and savings through integrated water management at buildings, monitoring of water usage and utilisation through smart meters. |
| **Smart Element** | • Smart monitoring devices as approximately one third of water consumption is attributed to non-revenue water.<br>• Water-efficient plumbing fixtures will reduce non-revenue water by 10% to 20%. |
| **Opportunity** | • **Water saving devices, water-efficient plumbing fixtures, smart water meter, high efficiency toilets, water efficient washing machines, smart monitoring and metering equipment, and leakage detection devices.** |
| **Main stakeholder** | • Governing authorities, such as Ministry of Energy, Green Technology, and Water (KETTHA), Ministry of Natural Resources and Environment (NRE), Water Asset Management Company (WAMCO), Department of Environment Malaysia (DOE). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Low |

## Digital Media
## High Speed Broadband (HSBB)

#37 opportunity

| | |
|---|---|
| Key Challenge | • Internet penetration is still low throughout the country and most users access the Internet at speeds of around one megabit per second, far lower than neighbouring countries. |
| Programme | • The High Speed Broadband (HSBB) plan calls for Telekom Malaysia to deploy high speed fiber access within the greater KL area. As of June 2011 the service had 142,000 subscribers and passed 943,000 premises with minimum speed of 10 Mbps. |
| Smart Element | • Having high-speed broadband connections in nearly every premise in Malaysia will make KL more competitive for attracting investment. |
| Opportunity | • **Smart applications such as smart grids, telecommuting and connected home applications to work more efficiently.** |
| Main stakeholder | • Ministry of Energy, Water and Communications, Malaysian Communications and Multimedia Commission.<br>• Telekom Malaysia. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Large | Low |

## Education
## Entry Point Projects (EPPs) Theme 1: Rapid Scaling Up

#38 opportunity

| | |
|---|---|
| Key Challenge | • Fragmentation and lack of scale. Need to encourage existing providers to increase capacity, or make it easier for new providers to enter the market. Need to maintain high-quality standards and prevent any crowding out of existing providers. |
| Programme | • EPP 1: Scaling up early child care and education centers.<br>• EPP 2: Improving early child care and education training.<br>• EPP 6: Expanding International Distance Learning. |
| Smart Element | • Early Child Care & Education (ECCE) enhancement with implementation of interactive E-learning through basic computer applications/ software, Asia Country-to-Country E-learning. |
| Opportunity | • **The development of private ECCE centres, research & development of innovative teaching & learning, development of E-learning expertise, transformation of total content to distance learning material.** |
| Main stakeholder | • Ministry of Education (MOE), Private Education Division, Welfare Department, Teacher Education Division. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Large | Low to medium |

## Education

# Entry Point Projects (EPPs) Theme 2: Concentration and Specialisation

#39 opportunity

| | |
|---|---|
| **Key Challenge** | • Wide variation in quality, particularly at the tertiary level. Best practice examples from countries suggest that a way forward lies in the development of integrated networks of institutions across one or more phases of the education value chain. |
| **Programme** | • EPP 8: Building a health sciences education discipline cluster.<br>• EPP 9: Building an advanced engineering, science and innovation discipline cluster.<br>• EPP 11: Launching Educity @ Iskandar. |
| **Smart Element** | • Advanced education systems, and in Iskandar educity opportunities involved with planning, infrastructure design and build, and advanced learning systems solutions. |
| **Opportunity** | • **Advanced Digital Learning Systems & Solutions.**<br>• **Business planning support, design and build of infrastructure.** |
| **Main stakeholder** | • Ministry of Higher Education (MOHE), Program Management office, Ministry of Science, Technology and Education. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Low to advanced |

## Education

# Literacy and Numeracy Program (LINUS): skills to be acquired after 3 years of education

#40 opportunity

| | |
|---|---|
| **Key Challenge** | • Research by the Ministry of Education (MOE) reveals that one factor that contributes to drop-out rates is the inability of students to cope with the syllabus being taught. |
| **Programme** | • To achieve this ambitious target, have developed a Literacy and Numeracy programme (LINUS) to ensure students acquire basic literacy (in Malay language) and numeracy skills. |
| **Smart Element** | • Screening process, teaching and learning modules, intensive teachers' training, intensive monitoring and supervision, expert facilitators at the district level, develop tailored strategies based on results of the screening test to address specific literacy and numeracy issues. |
| **Opportunity** | • **Extensive use of Smart/E-learning via electronic media, such as new computer programmes / software to boost up LINUS program.** |
| **Main stakeholder** | • Ministry of Education (MOE). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Large | Medium |

# Energy
## Smart Grid Pilot Project

#41 opportunity

| | |
|---|---|
| **Key Challenge** | • Long term implementation of smart grid in Malaysia would be based on technical and commercial viability of smart grid and understanding the technologies that work best in TNB's context. |
| **Programme** | • Tenaga Nasional Berhad (TNB), Malaysia's state-owned utility, is in the midst of implementing a demonstration project that will involve 5,000 consumers at three locations under different environments (industrial, commercial, green field). |
| **Smart Element** | • Improving reliability through automation, increasing customer participation through AMI deployment, improving energy efficiency through grid automation and demand side management and reducing carbon emissions through renewable energy integration and battery integration. |
| **Opportunity** | • **Phase 2 (until 2013): Opportunity for technology suppliers for AMI and energy efficiency. Phase 3 (2011-2015): Opportunity for technology suppliers for Solar photovoltaic, battery energy storage and electrical vehicles.** |
| **Main stakeholder** | • Tenaga Nasional Berhad (TNB). |

| Timelines | Size | Technology |
|---|---|---|
| Medium to long term | Medium | Low to medium |

# Energy
## Entry Point Projects 10 (EPPs 10): Building Up Solar Power Capacity

#42 opportunity

| | |
|---|---|
| **Key Challenge** | • Between 2015 and 2020, Peninsular Malaysia will need to build approximately 4 gigawatt of additional power capacity to meet rising demand while maintaining a healthy power reserve margin. |
| **Programme** | • The government is building up Solar Power Capacity which gives additional benefit to enhance energy independence, fulfil 'green' agenda, increase energy security, increase employment and catalyse local manufacturing and foreign direct investment. |
| **Smart Element** | • Independence from fossil fuels and zero carbon gas emissions, increased energy security, high job creation, potential and significant foreign direct investment. |
| **Opportunity** | • **Development of regulatory framework, business models development, including financing, public-private partnerships and the role of the Government, skills and learning development.** |
| **Main stakeholder** | • Ministry of Energy, Green Technology and Water (KeTTHA) Tenaga Nasional Berhad (TNB). |

| Timelines | Size | Technology |
|---|---|---|
| Medium (2015-2020) | Large | Medium |

# Health
## Scaling up telemedicine for both local and international markets

#43 opportunity

| | |
|---|---|
| Key Challenge | • Delivery of quality diagnostic services with minimal investment in physical logistics. |
| Programme | • Diagnostic Services Nexus (DSN) to achieve scale in telemedicine for eventual international outsourcing which will improve the quality of radiological services quality and increasing accessibility. |
| Smart Element | • Radiology and pathology services will be linked to the DSN via a teleradiology grid and will include general radiology, mammography, multi-slice cardiac and neuro computed tomography (CT) and general, cardiac, neuro and breast magnetic resonance imagery (MRI). |
| Opportunity | • **Telehealth and telemedicine.** |
| Main stakeholder | • Ministry of Health.<br>• MSC Malaysia. |

| Timelines | Size | Technology |
|---|---|---|
| Medium | Medium | High |

# Health
## Senior Living

#44 opportunity

| | |
|---|---|
| Key Challenge | • Ageing population with increased need for outpatient care and seniors living facilities. Seniors living care resides in the middle of the outpatient care continuum between post operative check-ins on one end and acute care nursing homes on the other. |
| Programme | • Economic Transformation Programme (Healthcare) – Senior Living. |
| Smart Element | • Home / Community-based care that includes assistive technology that is elder-care enabled to foster independent living, Chronic disease management for remote monitoring of patients, Integration of care through telemedicine. |
| Opportunity | • **Remote patient monitoring, telehealth, telemedicine, smartphone applications, assisted living technologies.** |
| Main stakeholder | • Ministry of Health.<br>• MSC Malaysia. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to mid term | Medium | Medium |

## Transport

# Automated Fare Collection Integration across All Public Transport

#45 opportunity

| | |
|---|---|
| Key Challenge | • Ticketing is complex for the multimodal commuter. Currently 16 different bus and rail operators across the Klang Valley have independent ticketing and collection systems. This results in long waiting times, and loss in fare revenue from ticket fraud. |
| Programme | • The creation of '1Ticket, 1Seamless Journey' system under the National Key Economic Areas (NKEAs) of the Government Transformation Programme (GTP). Currently AFC system within rail system only is in testing and commissioning. Integration across all transport (LRT, Komuter, Bus) is beyond 2012. |
| Smart Element | • Migrating users to a cashless system would approximately halve the transaction time it takes to purchase tickets, as well as reduce significantly the revenue leakage due to an imperfect cash system as cash handling processes are greatly reduced. |
| Opportunity | • **Integrated ticketing and automatic fare collection (AFC), alternative reloading infrastructure leveraging mobile operators and banks.** |
| Main stakeholder | • Performance Management & Delivery Unit (PEMANDU), Land Public Transport Authority (SPAD), Ministry of Transport (MOT). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to mid term | Medium | Medium |

## Transport

# Greater Kuala Lumpur EPP3 Connecting to Singapore via High Speed Rail System

#46 opportunity

| | |
|---|---|
| Key Challenge | • Connectivity to other hubs and connectivity within Greater Kuala Lumpur are both critical for urban growth and improved productivity of the urban population. |
| Programme | • Under Economic Transformation Programme (ETP) Entry Point Projects (EPPs) driven by Economic Planning Unit (EPU) & Land Public Transport Authority (SPAD). |
| Smart Element | • The proposed deployment of high speed rail system connecting Greater KL and Singapore will connect Southeast Asia's 2 largest economic agglomerations and unlock economic growth in intermediate Malaysian cities. |
| Opportunity | • **High Speed Rail System Technology which enables door-to-door travel times of just 1.5 to 2 hours with average speeds of 350 to 450 km/h; Rolling stock, Project management & planning, design & build, testing & commissioning.** |
| Main stakeholder | • Economic Planning Unit (EPU),Land Public Transport Authority (SPAD), Ministry of Transport (MOT), Ministry of Finance (MOF). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to long term | Large | Advanced |

# Transport
## Green Technology: Hybrid & Electric Vehicles

#47 opportunity

| | |
|---|---|
| Key Challenge | • Boost consumer awareness on green technology vehicles as currently the demand and market is still low. Moreover, the construction of charging stations and other necessary supporting infrastructure to enable the market to develop. |
| Programme | • Promote green technology and ensure sustainability development of the nation, full exemption of import duty and excise duty on hybrid and electric cars (below 2000cc) will be extended until 31st December 2013. |
| Smart Element | • Better fuel economy, lower greenhouse gases, and improved tailpipe emissions. |
| Opportunity | • **Hybrid & electric vehicles engineering production capabilities, marketing strategies to promote green technology vehicles, project management & planning of the infrastructure.** |
| Main stakeholder | • Green Technology Corporation, Ministry of Energy, Green Technology & Water, OEMs (especially Proton). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Advanced |

# Transport
## Integrated Urban Mass Rapid Transit (MRT) System

#48 opportunity

| | |
|---|---|
| Key Challenge | • A need to expand the coverage of the population living within an accessible distance of an efficient rail system. Greater KL's aspiration to achieve a 50% public transport modal share by 2020. |
| Programme | • Under the Government Transformation Programme (GTP), the Urban Public Transport National Key Results Area initiatives to increase existing urban rail capacity, primarily through investments in rolling stock. |
| Smart Element | • The propose MRT system for Greater KL will span 141 km with 3 major routes serving a radius of 20 km of the city centre. The system is estimated to be able to carry up to 2 million riders by 2020, serving 11% of total trips within Greater KL & 64% of travel in and out of the KL city centre. |
| Opportunity | • **Best-in-class Public Private Partnership, Project management from design to operation stage, fully integrated system to serve both existing & upcoming major new developments.** |
| Main stakeholder | • Economic Planning Unit (EPU), Land Public Transport Authority (SPAD), Ministry of Transport (MOT), Ministry of Finance (MOF). |

| Timelines | Size | Technology |
|---|---|---|
| Mid to long term | Large | Medium |

# Current and Future Smart Integration

| | Remarks | Level |
|---|---|---|
| Macro Environment | • Fast growing economy at annual growth rate of 5.9%. Per capita GDP is USD 15,800.<br>• Population in Greater Kuala Lumpur 7.2 million. | |
| Smart Opportunity | • Malaysia is in a stage of shifting from emerging market to developed market, and expecting smarter solutions.<br>• High government control and initiatives.<br>• Malaysian Government committed to achieving Developed Market status for Malaysia by 2020. Need outside sources of expertise for the conversion of Malaysia (and particularly KL) into a smart environment. | |
| Fit with Capability | • Existing and proven smart technologies and solutions in developed countries would be expected in Malaysia.<br>• Competition with international players would be high. | |
| Timeframe | • Several smart initiatives are in pipeline.<br>• Some projects may take longer time. | |
| Overall Attractiveness | • Opportunities would be relatively high in Malaysia and its capital Kuala Lumpur as the economy is shifting to a developed market status.<br>• Connection with the officials will increase opportunities. | |

# Summary of Hot Spots by Theme

| Theme | Current status | Smart outlook | Timeframe |
|---|---|---|---|
| Buildings & Environment | Building management systems focusing on energy and water efficiency are available. | Low/Zero Energy Office and water demand management. | Immediate to long term |
| Digital Media | Mobile Penetration > 100%, household broadband penetration >40%. | The HSBB will help alleviate the low broadband penetration while 4G services should be commercialised in 2012. | Mid term |
| Education | Implemented smart learning through electronic media. | Scaling up & improving early child care and education centers. | Immediate to long term |
| Energy | Malaysia Building Integrated Photovoltaics, Malaysia Industrial Energy Efficiency Programme. | Building up Solar power Capacity, Smart Grid System. | Immediate to long term |
| Health | Establishing a national ICT infrastructure ready for next generation applications | International diagnostic services that leverage on Malaysia's telemedicine infrastructure. | Immediate to mid term |
| Transport | High dependence of private transport due to low quality public transport. | AFC integration will improve convenience of public transport. | Immediate to long term |

# Smart City Projects in Other Cities in Malaysia

## Iskandar Malaysia: A World Class Metropolis Development

### Project Overview

- Located at the southernmost tip of Peninsular Malaysia with coverage area of 2,217 sq. km, (within the state of Johor), the Iskandar Malaysia is set to become Southern Peninsular Malaysia's most developed region, where living, entertainment, environment and business seamlessly converge within a bustling and vibrant metropolis.
- There are 32 blueprints to provide a more comprehensive, cohesive and holistic plan in Iskandar Malaysia covering urban planning, infrastructure, environment, utilities and other aspects.
- 5 flagship zones have been designated as key focal points for development until 2025; Johor Bahru City, NusaJaya & Medini, Western Gate Development, Eastern Gate Development and Senai-Skudai.

### A: Johor Bahru City

- Johor Bahru is the Central Business District and the State Capital of Johor.
- In the future, a multi-modal terminal will be developed in Flagship A, as well as an MRT/ LRT system connecting Johor Bahru City Centre to other areas in Iskandar Malaysia.

### B: Nusajaya & Medini

- Smart City Nusajaya would be the hub such as for medical facilities, ICT dev., educational institutions, and biotechnology.
- E.g, Educity @ Iskandar, fully integrated best-in-class education hub
- Alfiat healthpark; e.g modern medicine.

### C: Western Gate Development

- Western Gate Development
- The key economic activities are port and marine services, engineering, hitech and manufacturing.
- The proposed 2,215 acres of the Maritime Centre at Tanjung Bin also offer investment opportunities to players in the oil and gas industry.

### D: Eastern Gate Development

- Asia Pacific Trade & Expo City (APTEC City): master plan concept of an integrated environment for business, living, leisure, ICT, health, education and entertainment that supports the integrated trade and distribution center.

### E: Senai-Skudai

- Flagship E, Senai-Skudai will be the hub for agro and food processing, ICT and retail tourism.
- MSC Cyberport Johor; Global ICT business hub with a world class living environment for ICT companies from all over the world within Iskandar Malaysia.

# Philippines

# Philippines

**P87 Context**

Demographic and Macro Economic Context
Principal Challenges
Smart Solutions

**P89 Opportunities**

Buildings and Environment
Digital Media
Education
Energy
Health
Transport

**P94 Current and Future Smart Integration**

**P95 Summary of Hot Spots by Theme**

## Key:

This key explains the broad parameters that were used in calculating the relative timeline, size, and technology levels deployed per each opportunity that follows:

| Timelines | Size | Technology |
|---|---|---|
| **Immediate**<br>Less than 18 months | **Small**<br>Less than £50 million | **Low**<br>Existing/proven technology |
| **Mid term**<br>18 months to 3 years | **Medium**<br>£51 million to £200 million | **Medium**<br>Technology in introduction |
| **Long term**<br>Over 3 years | **Large**<br>Over £200 million | **High**<br>Technology to be introduced |

**UKTI Contact in the Philippines:**
Joyce Guzon
Trade and Investment Manager
Joyce.Guzon@fco.gov.uk

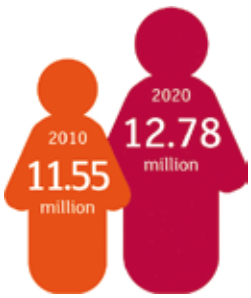
# Demographic and Macro Economic Context

**Brief Overview of Manila**

- The city of Manila is the capital city of the Philippines and one of the cities that make up the greater metropolitan area of Metro Manila. The greater metropolitan area of Metro Manila is also commonly known as the National Capital Region (NCR).
- Metro Manila lies on the peninsular between Manila Bay and Laguna de Bay in Southern Luzon. It has a land area of 636 km$^2$ accounting for approximately 0.2% of the country's total land area and is divided into 4 districts with 12 cities and 5 municipalities.
- The language that is widely used in Manila is Filipino Tagalog. However, English is also the language most widely used in education and business throughout the Metro Manila region.

## Demographic Profile

- Metro Manila was the home of 11.55 million people in 2010. Manila has a population density of 18,160/km$^2$. The population is expected to grow at an average annual growth of 1.1% to reach 12.78 million in 2020.
- Average household size is 4 to 5 persons. Nearly half of the families in Metro Manila fall under the PHP 100,000-249,000 (USD 2,000-4,980) annual income class.




## Economic Profile

- Manila's economy is diverse and multifaceted. Manila's GDP in 2010 was PHP 3,274.2 billion (USD 75 bn), growing at 7.3% from 2009.
- The city recorded GDP per capita of PHP 83,261 (USD 2,000).
- Philippines' unemployment rate in 2010 stood at 7.2% as compared to 7.5% in 2009.

## Principal Challenges

| | |
|---|---|
| Buildings & Environment | • There is an availability of skilled personnel at competitive wages, though many are also deployed abroad as Overseas Filipino Workers (OFWs).<br>• Limited familiarity with advanced building technologies, and the building-related industry is dominated by conglomerates. |
| Digital Media | • The rapid growth in IT-BPO (Business Process Outsourcing) demands for commensurate expansion in ICT infrastructure. Semi-urban and rural areas which are under-penetrated by broadband facilities offer significant opportunities to telecom providers. |
| Education | • Although the literacy rate of the Philippines is at 93 percent, there is still big room to improve the quality of education in the country and upgrade teachers competence and effectiveness. In specific industries, there are gaps between students' level of learning and the skills needed by companies. |
| Energy | • It is the over-all cost of power that is high, not just in transmitting it.<br>• The Philippines needs to have an optimal mix in the use alternative energy and fossil fuels to attain an economical cost of power. Apart from promoting use of renewable energy, government is also promoting the exploration of oil & gas. |
| Health | • Healthcare delivery to isolated areas. Remote areas on the islands of Philippines makes it challenging to deliver healthcare. Basic healthcare is limited to Rural Health Units (RHU). |
| Transport | • Rapid urbanisation in Metro Manila and adjoining areas increased pressures on the existing public transport system.<br>• Emissions from the transport represent 80% of air pollution in Metro Manila. |

## Smart Solutions

| | |
|---|---|
| Buildings & Environment | • Projected growth of the construction industry attributed to increasing demand from the industrial sector, Planned investments in infrastructure,<br>• Government thrust to promote tourism, Increasing demand for housing.<br>• The concept of "green building" or being environment-friendly is being promoted around creating awareness among various industry players. |
| Digital Media | • ICT initiatives in Manila are severely lacking and the country needs serious regulatory reform to make the city a competitive business destination. |
| Education | • The Philippines Department of Education (DepEd) has implemented Schools First Initiative under Basic Education Sector Reform (BESRA). DepEd has also developed Philippine Education For All in 2015 blueprint. |
| Energy | • Abundant renewable energy sources.<br>• One of the regional leaders in renewable energy as almost 30% of its power comes from renewable energy. The Philippines is world's second largest producer of geothermal power. |
| Health | • The Philippines Government initiated Wireless Access for health program to deliver healthcare in remote areas and provide quick, updated support to rural healthcare workers. |
| Transport | • Deployment of Intelligent Transport System (ITS) Technology.<br>• Electrical Transport Program- the use of electric vehicles to ensure a sustainable, environment-friendly and energy-efficient Transport system in the city.<br>• Government commitment to pursue and implement major mass transport projects. |

## Buildings & Environment
## Industrial Waste Exchange Program (IWEP)

#49 opportunity

| | |
|---|---|
| Key Challenge | • Industrial waste management is highly competitive. Price competition impacts on revenues and profits of the participants due to multi level participants such as multi national conglomerates, private waste management providers and contractors. |
| Programme | • IWEP encourages the exchange of waste of one industry by another industry for re-use or recycling. This results in industrial waste management services in the country move towards recycling services. |
| Smart Element | • Reduce environmental impacts from industrial waste disposal and generate economic returns through promotion of resource recovery from industrial waste. |
| Opportunity | • **Electronic-waste recycling is in high demand due to the country's exports focus on electronics, with semiconductors in particular.** |
| Main stakeholder | • Local government units, private waste management contractors. |

| Timelines | Size | Technology |
|---|---|---|
| Mid term | Small to medium | Medium |

## Buildings & Environment
## Building Automation System – focusing on air conditioning energy efficiency

#50 opportunity

| | |
|---|---|
| Key Challenge | • Price sensitive market with low awareness and acceptance on value added services or products. |
| Programme | • Philippine Energy Plan 2009-2030. |
| Smart Element | • Provides optimal operating schedules that improve system efficiency, especially for manufacturing facilities. Coordinated behaviour across multiple systems can provide savings range from 15% to 30% of energy costs. |
| Opportunity | • **High growth industrial and commercial sectors, especially office buildings in Metro Manila.** |
| Main stakeholder | • Philippines Department of Energy (DOE). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to mid term | Small to medium | Medium |

## Digital Media
### New Generation Network Migration

#51 opportunity

| | |
|---|---|
| Key Challenge | • The largest fixed-line operator in the country, the PLDT has announced its intentions to migrate all of its subscribers to their Next-Generation Broadband Network by 2013. |
| Programme | • The operator will migrate all of its subscribers to IP based solutions as opposed to traditional PSTN lines for its 1.8 million subscribers. |
| Smart Element | • Offering IP as opposed to circuit-switched services will allow the operator to offer smart services such as VoIP, IPTV etc to its entire subscriber base within two years. |
| Opportunity | • **VoIP, IPTV and associated high-definition video services such as e-learning and e-health.** |
| Main stakeholder | • PLDT. |

| Timelines | Size | Technology |
|---|---|---|
| Medium | Large | Low |

## Education
### High Competency for All Teachers

#52 opportunity

| | |
|---|---|
| Key Challenge | • One of the current challenges in Philippines education system is the level of competency among teachers, as it is the most critical part in determining students and schools performances. |
| Programme | • One of the BESRA Key Reform Thrust is to raise the prevailing standards for teachers to meet the demands for better learning outcomes. |
| Smart Element | • To equip teachers with better teaching options such as using computer-aided materials and ICT related techniques. |
| Opportunity | • **Strong need for teachers' training courses and learning aids in order to achieve international qualification and accreditation. Opportunities in procurement of the e-learning, ICT related courses materials and equipments.** |
| Main stakeholder | • Department of Education (DepEd). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Low |

## Education
## E-Learning Environment

#53 opportunity

| | |
|---|---|
| Key Challenge | • Slow adoption of E-learning environment due to a relatively lack of infrastructure, access, investment and applicable pedagogy. |
| Programme | • Policy directions for ICT use in primary and secondary schools with the objective to create and promote relevant curriculum, ensure accessibility and availability of ICT by engaging stakeholders, support school-based ICT integration programs. |
| Smart Element | • Strong need for thematic teachers' training courses and learning aids as well as integration of ICT in the curriculum in order to achieve international qualification and accreditation. |
| Opportunity | • **Opportunities in the e-learning, ICT related courses and materials, electronic library systems and computer procurement.** |
| Main stakeholder | • Department of Education (DepEd). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Low |

## Energy
## Renewable Energy Act

#54 opportunity

| | |
|---|---|
| Key Challenge | • Philippines need to utilise its abundant source of renewable energy to ensure energy security as the country does not have a vast resource of fossil fuel. |
| Programme | • Started in 2008, the renewable energy act aims to promote the development of renewable energy in The Philippines. |
| Smart Element | • Generation using renewable energy, consumption of renewable energy through a green energy option allowing the consumers to choose renewable energy power sources, net metering. |
| Opportunity | • **The government aims to increase the share of renewable to 40% by 2020.** |
| Main stakeholder | • Department of Energy. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Large | Medium |

## Health
## Application of 3G Technology in Rural Areas

#55 opportunity

| | |
|---|---|
| Key Challenge | • Rural Health Unit level information is critical for public health-related decision and policy making. Traditionally this information has been manually recorded on paper, a process that is not only time consuming, but also error prone. Accessing and managing information in this manner is labor intensive and the data can often be outdated or incorrect. |
| Programme | • Wireless Access For Health. |
| Smart Element | • Instant healthcare information sent instantly via 3G technology. |
| Opportunity | • **Community Health Information Tracking System (CHITS) applications for electronic medical record system, expanded and enhanced to be compatible with Field Health Service Information System (FHSIS).** |
| Main stakeholder | • Department of Health, Tarlac local government units, Tarlac State University, National Telehealth Center. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to mid term | Medium | Low to medium |

## Health
## Telemedicine – Healthcare to Remote Area

#56 opportunity

| | |
|---|---|
| Key Challenge | • Specialist healthcare delivery to remote areas through progressive implementation. |
| Programme | • Mobile Surgery Services Project. |
| Smart Element | • Resident doctors use to consult specialists online, via a webcam and a free Windows-based video chat and video conferencing application. |
| Opportunity | • **Telehealth and telemedicine.** |
| Main stakeholder | • Physicians for Peace (PfP)-Philippines, National Telehealth Center of the University of the Philippines, Tarlac State University, Department of Health and the Tarlac provincial government. |

| Timelines | Size | Technology |
|---|---|---|
| Short to medium term | Medium | Medium to high |

# Transport
## Intelligent Transport System

#57 opportunity

| | |
|---|---|
| **Key Challenge** | • Urgent need to increase mobility in the city through the provision of an integrated public transport system to cope with severe traffic congestion caused by increasing migrating population and rapid urbanisation. |
| **Programme** | • The Department of Transport and Communication identified the need to increase mobility through an intelligent integrated public transport system. |
| **Smart Element** | • Real time traffic monitoring system to provide fast/accurate information on the traffic flows, while the electronic toll collection system to help reduce transaction time and eventually reduce traffic waiting. |
| Opportunity | • **Business potentials in area of real-time traffic monitoring system, electronic toll collection system (ETC), closed circuit camera (CCTV), variable message signs (VMS) for traffic management, etc.** |
| **Main stakeholder** | • Department of Transport and Communication (DOTC). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Low to medium |

# Transport
## Philippines Electric Vehicle Strategy

#58 opportunity

| | |
|---|---|
| **Key Challenge** | • Transport sources account for the bigger percentage of the worsened air pollution in Metro Manila. There is a direct correlation between the worsening traffic situation and increasing emission of pollutants. |
| **Programme** | • Implementation of National Electric Vehicle Strategy in Philippines. |
| **Smart Element** | • Innovative Green transport systems such as electric tricycles, e-jeepneys, buses and electric bicycles have the potential to lessen pollution caused by conventional transport and the dependency on fossil fuels. |
| Opportunity | • **Business potential in the supply and maintenance of electrical vehicles and infrastructure and rechargeable batteries.** |
| **Main stakeholder** | • Institute of Climate and Sustainable Cities (iCSC).<br>• Department of Transport and Communication (DOTC).<br>• Department of Energy and Natural Resources (DENR). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Medium |

# Current and Future Smart Integration

| | Remarks | Level |
|---|---|---|
| Macro Environment | • Manila is one of the largest markets in the Philippines which accounts for 33% of Philippines GDP and contributes 41% of the country's total tax collections.<br>• 12 million population living in the NCR. | |
| Smart Opportunity | • Prospective growth in most industries in Metro Manila is evident as there is a high population growth in the capital that needs smart and integrated improvements especially in the transport infrastructure. | |
| Fit with Capability | • The country received a lot of funds and financial assistance from the ADB/IMF and some countries like Japan and Australia in assisting them to develop further. | |
| Timeframe | • Several smart initiatives are identified and already in the pipeline.<br>• Some projects may take longer than anticipated. | |
| Overall Attractiveness | • The Philippines is an open economy that welcomes full foreign ownership in many sectors. The country also provides special economic zones that offer preferential tax incentives.<br>• Affordable wages and utilities contribute to business cost savings. | |

# Summary of Hot Spots by Theme

| Theme | Current status | Smart outlook | Timeframe |
|---|---|---|---|
| Buildings & Environment | The regulations are in place with growing concern on green and energy sustainability. | The waste exchange program would be well received with support from regulatory bodies. | Mid term |
| Digital Media | Mobile penetration is > 80%; Major social networking capital; Relatively low household broadband penetration, but very fast growth in mobile internet usage. | Promising market for smart phones; Low Household PC penetration translates into opportunities for vendors. Market open to new telecom providers. | Immediate to long term |
| Education | Low take up of e-learning among Filipinos. | Plan to create an electronic environment and to make Manila a modern hub. | Immediate to long term |
| Energy | High cost of electricity, and need to increase supply to meet demand. | Expected to be one of the regional leaders in renewable energy installed capacity. | Immediate |
| Health | Telemedicine and mobile healthcare applications through 3G technology. | Standardisation of mobile technology for healthcare to support data, video and voice at the nationwide level. | Immediate to long term |
| Transport | Rapid population growth had caused massive traffic congestion in Manila. | There is strong need for an integrated public transport system. | Immediate to long term |

# Singapore

# Singapore

**P99 Context**

Demographic and Macro Economic Context
Principal Challenges
Smart Solutions

**P101 Opportunities**

Buildings and Environment
Digital Media
Education
Energy
Health
Transport

**P106 Current and Future Smart Integration**

**P107 Summary of Hot Spots by Theme**

## Key:

This key explains the broad parameters that were used in calculating the relative timeline, size, and technology levels deployed per each opportunity that follows:

| Timelines | Size | Technology |
|---|---|---|
| **Immediate**<br>Less than 18 months | **Small**<br>Less than £50 million | **Low**<br>Existing/proven technology |
| **Mid term**<br>18 months to 3 years | **Medium**<br>£51 million to £200 million | **Medium**<br>Technology in introduction |
| **Long term**<br>Over 3 years | **Large**<br>Over £200 million | **High**<br>Technology to be introduced |

**UKTI Contact in Singapore:**
Elsie Yim
Senior Trade and Investment Attaché
Elsie.Yim@fco.gov.uk

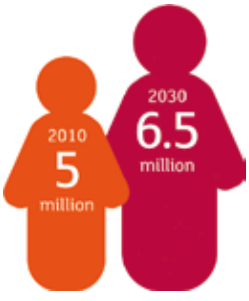
# Demographic and Macro Economic Context

**Brief Overview of Singapore**

- Singapore is an island country at the southern tip of the Malay Peninsula in South-East Asia. The area size of Singapore is 710 km$^2$ and the country is expanding its land by reclamation, and it will reach 810 km$^2$ in 20 years.
- Singapore is managing the use of land space very carefully to balance between business and residential needs. Urbanisation rate (people living in urban area) is 100% in Singapore.
- Singapore is a logistics and financial hub in South-East Asia.

## Demographic Profile

- The population has increased nearly 20% in the last decade from 4 million to 5 million and will increase nearly 30% in the next 2 decades to 6.5 million.
- Population is ageing. There was a 5% decrease in the proportion of those under 15 years old in Singapore over the last decade. Working population is expected to decrease in the next decade.
- Singapore is a multi race city consisting of Chinese, Malay and Indian.




## Economic Profile

- GDP per capita nearly doubled from USD 23,414 in 2000 to USD 43,867 in 2010.
- Average monthly household income increased from USD 2,893 in 2000 to USD 5,291 in 2010.
- Service industry employs 78% of the working age population, followed by manufacturing, with 15% in 2010.
- The unemployment rate is 2.2% in 2010.

## Principal Challenges

| | |
|---|---|
| Buildings & Environment | • Intense competition due to open economy. As there are no tariffs, taxes and duties imposed on imports of construction related equipments and building materials to Singapore, the market is open for firms from all countries. |
| Digital Media | • The Singaporean government is quite open and receptive to implementing and driving smart initiatives. |
| Education | • The population has increased nearly 20% in the last decade from 4 million to 5 million and will increase nearly 30% in the next 2 decades to 6.5 million.<br>• Population is aging. There was a 5% decrease in the proportion of those under 15 years old in Singapore over the last decade. Working population is expected to decrease in the next decade. |
| Energy | • Need to maintain the high reliability of electricity network and integrate green energy in a power network which is already highly mature and reliable. |
| Health | • The need of integrated healthcare and ageing population. Singapore requires a national integrated electronic health information system to streamline its healthcare delivery. |
| Transport | • Congestion both in public transport and on road.<br>• Due to land scarcity in Singapore, there are restrictions on expansion of the road network. |

## Smart Solutions

| | |
|---|---|
| Buildings & Environment | • Strong push from the government. With the setting up of Singapore Green Building Council (SGBC) and government driving efforts to green at least 80% of the buildings in Singapore by 2030. |
| Digital Media | • Singapore is one of the first countries in Asia to have a national broadband plan and was also one of the first to deploy 4G LTE services. |
| Education | • The 3rd Masterplan for ICT in Education (2009-2014) by Government.<br>• National CET (Continuous Education & Training) campus setup project. |
| Energy | • Singapore has a strong drive for green energy and smart grid through its various completed and ongoing initiatives such as Intelligent Electronic System pilot project and electrical vehicle test bedding. The top level thrust for smart solutions is a major driver. |
| Health | • The need for an integrated healthcare, and an ageing population.<br>• Singapore requires a national integrated electronic health information system to streamline its healthcare delivery. |
| Transport | • 4 new MRT lines to be built by 2020.<br>• Next generation ERP which uses Global Navigation Satellite System (GNSS) instead of ERP gantries. |

## Buildings & Environment

# BCA Green Mark: Applicable to all new and retrofitting buildings

#59 opportunity

| | |
|---|---|
| **Key Challenge** | • Many of the certified green buildings are from the public sector. The uptake and participation of private sector in BCA Green Mark is comparatively lower but it has the best potential for green building development. |
| **Programme** | • BCA Green Mark Scheme is recognised as one of the International Green Building Rating Systems by the World Green Building Council.<br>• All new and retrofitting of government buildings have to be Green Mark certified. |
| **Smart Element** | • Buildings have close to one third of the national energy consumption. Green Mark focuses mainly on energy efficiency. |
| **Opportunity** | • **Green integrated facilities management (GIFM), energy monitoring system (EMS), building automation, photovoltaic (PV) technologies, wastewater management.** |
| **Main stakeholder** | • Building and Construction Authority (BCA), Singapore Green Building Council (SGBC), Housing & Development Board (HDB). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Large | Medium to large |

## Buildings & Environment

# Storm-water Management System

#60 opportunity

| | |
|---|---|
| **Key Challenge** | • It is an ongoing process to monitor storm-water as findings reveal maximum rainfall intensities have increased in the past 30 years. Conventional design approach and standards are not sufficient to secure an appropriate drainage system for the future. |
| **Programme** | • National Water Agency announces comprehensive S$750 million action plan on Drainage Design and Flood Protection Measures.<br>• Improved heavy rain alert system; a new flood prediction model; Set up fresh flood prevention and alleviation guidelines for new buildings, which may include roofs with plants to slow and retain rain water. |
| **Smart Element** | • Singapore now needs to move towards a more integrated risk-based approach based on dynamic modelling and comprehensive monitoring.<br>• Modelling tools are essential in simulating flows and water levels in drainage systems. |
| **Opportunity** | • **Advanced instrumentation, information technology and modelling capabilities.**<br>• **Monitoring device/system such as rainfall radar, flow meters rain gauges and water level sensors, integrated information systems.** |
| **Main stakeholder** | • Singapore's National Water Agency (PUB). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium to large | Medium |

## Digital Media
## National Broadband Network

#61 opportunity

| | |
|---|---|
| Key Challenge | • Singapore faces pressure from other competing regional business hubs such as Hong Kong, Kuala Lumpur and Shanghai and to entice businesses to keep offices in the country. |
| Programme | • The government unveiled a National Broadband Network in 2007 as part of its Intelligent Nation 2015 Master Plan. The plans calls for 95% of households and businesses to be connected to a high-speed fiber optic network by 2012. |
| Smart Element | • Having high-speed broadband connections in nearly every premise in Singapore will allow for future smart applications such as smart grids, telecommuting and connected home applications to work more efficiently. |
| Opportunity | • **Smart –grid applications, remote monitoring, telehealth, telecommuting, connected home.**<br>• **Online creative content, gaming, digital media providers.** |
| Main stakeholder | • Media Development Authority of Singapore.<br>• Info-communication Development Authority of Singapore.<br>• Telecommunication companies: SingTel, Starhub, M1. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Large | Medium |

## Education
## The 3rd Masterplan for ICT in Education by Ministry of Education

#62 opportunity

| | |
|---|---|
| Key Challenge | • New demand to change learning environment using advanced IT infrastructure.<br>• A highly competitive education system with highly regarded national exams. |
| Programme | • Strengthening Integration of ICT into Curriculum, Pedagogy and Assessment.<br>• Differentiated Professional Development of ICT for teaching and learning.<br>• Enhanced ICT Provisions based on pedagogical needs. |
| Smart Element | • Leveraging ICT technology for enhanced learning environment classroom experience.<br>• Establishment of programmes such as FutureSchools@Singapore to push the frontiers of ICT in teaching and learning.<br>• Wireless internet access. |
| Opportunity | • **Continuous investment of Government to upgrade school IT infrastructure.**<br>• **Software and content to fit with IT infrastructure.**<br>• **E-assessment opportunities including assessment for 21st Century Skills.** |
| Main stakeholder | • Ministry of Education; National Institute of Education; Infocomm Development Authority (IDA). |

| Timelines | Size | Technology |
|---|---|---|
| Long term | Large | High |

## Education

# New Continuing Education & Training (CET) Campuses

#63 opportunity

| | |
|---|---|
| Key Challenge | • New demand to educate senior and middle-aged people to encourage them to find new employment opportunities. |
| Programme | • Nationwide vocational plan launched by the Ministry of Manpower, in order to prepare the Singapore workforce for the future and maintain a competitive advantage for Singapore. |
| Smart Element | • One-Stop Centre integrating career coaching, training, assessment and career services. |
| Opportunity | • **CET Campus East and West will be developed by 2013 and they are expected to train 50,000 people annually.**<br>• **E-education/training programmes, IT facilities, e-assessment/certification.** |
| Main stakeholder | • Ministry of Education.<br>• Ministry of Manpower ( Workforce Development Agency). |

| Timelines | Size | Technology |
|---|---|---|
| Mid term | Medium | Low |

## Energy

# The 1st Experimental Power Grid Research Centre in South-East Asia

#64 opportunity

| | |
|---|---|
| Key Challenge | • Singapore aims to project itself as a pioneer in smart grid technology research and establish itself as a platform for testing various smart grid technologies. |
| Programme | • The 1st experimental power grid research centre, called Experimental Power Grid Centre (EPGC), in Southeast Asia was launched in July 2010. The construction was finished in 2011.<br>• USD 29 million project to develop and test facility for smart grid solutions. |
| Smart Element | • The project will test a range of smart grid technologies at a 1 MW power grid to enhance the capabilities of Singapore's power grid infrastructure. |
| Opportunity | • **EPGC is expected to serve as pre cursor to many smart initiatives in Singapore and involvement in experimental projects could lead to successful contracts in future.**<br>• **Energy Management Systems, Technologies (Smart Meters, Sensors, Monitors, Analytics), Renewable Energy Technology (PV), and expertise in integration of energy management systems and networks.** |
| Main stakeholder | • Energy Market Authority (EMA), Infocomm Development Agency (IDA), Agency for Science, Technology and Research (A*STAR).<br>• Shortlisted IBM, Accenture, Logica and Siemens. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Small | High |

# Energy
## Development of a Micro Grid Test Bed

#65 opportunity

| | |
|---|---|
| Key Challenge | • Grid connection of clean energy sources provides unique set of challenges such as intermittent storage, battery storage, etc. |
| Programme | • A test bed at the Pulau Ubin area aims to assess the reliability of power supply using intermittent sources of energy and building capabilities in the area of smart grid design, system integration and managing intermittent sources of energy. |
| Smart Element | • Interconnection of renewable sources of energy such as biodiesel and solar PV to the grid. Cost competitive power supply to end users ($0.8/kWh by clean energy compared to $1/kWh being provided by diesel generated power). |
| Opportunity | • **Construction of micro grid is expected to take place between the first half of 2012 to the end of 2012 being delivered by Singapore consortium comprising Daily Life Renewable Energy Pte Ltd and OKH Holdings Pte Ltd).**<br>• **Key opportunities would arise for integrators, contractors, and renewable energy technology vendors beyond this pilot stage.** |
| Main stakeholder | • Energy Market Authority (EMA). |

| Timelines | Size | Technology |
|---|---|---|
| Short to meedium term | Medium | Medium |

# Energy
## Intelligent Energy System Pilot Project

#66 opportunity

| | |
|---|---|
| Key Challenge | • Singapore aims to adopt and roll out workable Smart Grid solutions for the Singapore power system with a particular focus on managing customer demand and enhancing efficient use of energy. |
| Programme | • Energy Market Authority (EMA) started IES project in 2009 end aimed at developing the infrastructure for AMI and test the benefits by the use of AMI technology by customers. |
| Smart Element | • Use of smart meters to help customers follow and reduce their electricity demand.<br>• Reduce peak load requirement for Singapore power system thereby reducing the need for expensive peaking power plants. |
| Opportunity | • **The first phase (2010-2012) focus on developing the AMI infrastructure required for demand side usage control.**<br>• **Second phase (2012-2013) focus on measuring the benefit to customers by AMI.** |
| Main stakeholder | • Energy Market Authority.<br>• Accenture is implementing phase 1 of the project with its partners (ST Electronics, Oracle, Hewlett Packard, Power Automation, Control4 and Greenwave). |

| Timelines | Size | Technology |
|---|---|---|
| Short to medium term | Medium | Medium |

## Health
# Integrated Health Information System Across Singapore

#67 opportunity

| | |
|---|---|
| Key Challenge | • Create a system of integrated care that allows integration of healthcare information across the whole industry of Singapore healthcare system. Improve management of chronic diseases, reduce test duplication and better patient care. |
| Programme | • National Electronic Health Record (NEHR).<br>• Integrated Clinical Management System (CMS).<br>• Personal Health Record (PHR) Program. |
| Smart Element | • Integration of health record through extensive ICT infrastructure will lay path for other smart applications. |
| Opportunity | • **Phase 2 NEHR, CMS and PHR.**<br>• **Future development of ICT based applications e.g. integrated hospital based system, telehealth, telemedicine and consumer health.** |
| Main stakeholder | • MOH Holdings Pte Ltd and iHIS Pte. Ltd, Ministry of Health, iN2015 taskforce (Info-Communication Development Authority). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Medium |

## Health
# Next Generation Properties for Elderly with Assisted Living Facilities

#68 opportunity

| | |
|---|---|
| Key Challenge | • Ageing population that demand solutions for the elderly to live a better quality life. |
| Programme | • Silver Community Test Bed Programme to identify and develop technologies for next generation properties with assisted living facilities. |
| Smart Element | • Home / Community-based care that includes assistive technology that is elder-care enabled to foster independent living, Chronic disease management for remote monitoring of patients, Integration of care through telemedicine. |
| Opportunity | • **Remote patient monitoring, telehealth, telemedicine, smartphone applications, assisted living technologies.** |
| Main stakeholder | • Ministry of Community Development, Youth and Sports.<br>• EDB-MOH Health & Wellness Programme Office.<br>• Property developers e.g. Broadway Malyan,Sim Lian Group Ltd, Elderly Housing Development and Operations Corporation.<br>• Housing Development Board (HDB). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to mid term | Medium | Medium |

## Transport

# ERP II: The first ever distance and time based road pricing system

#69 opportunity

| | |
|---|---|
| **Key Challenge** | • In the face of worsening congestion, Singapore was amongst the first cities globally to introduce a system of Electronic Road Pricing (ERP). Despite its relative success, the entry-base system is imperfect as it does not take into account the actual usage of the road and amount of congestion caused. |
| **Programme** | • The Ministry of Transport has proposed upgrading ERP I and replacing it with a distance-based and therefore more equitable congestion charge (ERP II).<br>• Tender awarded to four consortia to conduct the System Evaluation Test. |
| **Smart Element** | • ERP II would make the make transport system completely demand-based.<br>• The Land Transport Authority is proposing to use satellite tracking to follow vehicles' movements coupled with more efficient payment options and solutions. |
| **Opportunity** | • **As partner /supplier to consortia going forward beyond the stage of system evaluation testing.**<br>• **Global Positioning Systems (GPS) systems: in-vehicle units and payment solutions; navigation and dynamic route guidance systems; traffic monitoring solutions.** |
| **Main stakeholder** | • Land Transport Authority; 4 Consortia: Kapsch TrafficCom AB, MHI Engine System Asia Pte Ltd & NCS Pte Ltd, ST Electronics (Info-Comm Systems) Pte & IBM Singapore Pte Ltd, and Watchdata Technologies Pte Ltd & Beijing Watchdata System Co Ltd. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Medium |

## Transport

# New Rail Network of Mass Rapid Transit (MRT) and Light Rail Transit (LRT)

#70 opportunity

| | |
|---|---|
| **Key Challenge** | • Trains are congested due to increasing population despite rail network expansion and increased frequency. |
| **Programme** | • As of 2009, there are 4 MRT and 3 LRT lines with total length of 147.7km which had increased by 63% from 90.8km in 2000.<br>• 4 new MRT lines will be built by 2020 which make total rail network 278km. |
| **Smart Element** | • Rail management system to control 8 MRT lines more efficiently and seamlessly to other transport modes. |
| **Opportunity** | • **Rail management system.**<br>• **IT infrastructure within stations and trains.** |
| **Main stakeholder** | • Land Transport Authority (LTA).<br>• ComfortDelGro: Operates SBS Transit buses and MRT, and taxis.<br>• SMRT: Operates SMRT buses, MRT and taxis. |

| Timelines | Size | Technology |
|---|---|---|
| Long term | Large | Medium |

# Current and Future Smart Integration

| | Remarks | Level |
|---|---|---|
| Macro Environment | • A small city country with total population of 5 million, expected to increase to 6.5 million by 2030.<br>• Developed economy but the growth rate is still high. | |
| Smart Opportunity | • Very open for foreign investments and capabilities.<br>• Several smart initiatives are on-going at country level with strong government support. | |
| Fit with Capability | • Given the high broadband penetration, favourable policies and attitudes, Singapore is a great test-bed for most advanced smart technologies and solutions available.<br>• Severe competition with international and local companies. | |
| Timeframe | • Several smart city projects are on going and new initiatives will be expected in short term.<br>• New technologies and solutions can be expected in near future. | |
| Overall Attractiveness | • Opportunities would be high in Singapore as many projects are on-going and similar level of smart solutions can be applied to Singapore. | |

# Summary of Hot Spots by Theme

| Theme | Current status | Smart outlook | Timeframe |
|---|---|---|---|
| Buildings & Environment | All new and retrofitting buildings have to be Green Mark certified. | Green integrated facilities management (GIFM), energy monitoring system (EMS), building automation, photovoltaic (PV) technologies, wastewater management. | Immediate to long term |
| Digital Media | Mobile Penetration > 100%, household broadband penetration> 90%. | The NBN will provide faster access to 95% of the population within three years while 4G service started in late 2011. | Immediate |
| Education | New demand to change learning environment using advanced IT infrastructure. | Software and content to fit with IT infrastructure. | Long term |
| Energy | Energy dependent on import due to no domestic natural resources. | Renewable and sustainable energy, smart grid. | Mid to long term |
| Health | Building of fundamental technologies for future smart application. | Assisted living for elderly will be driving the smart applications in the future. | Mid to long term |
| Transport | Entry-base Electric Road Pricing (ERP) with gantries. | Distance-base ERP using GPS system. | Immediate |

# South Korea

# South Korea

**P110 Context**

Demographic and Macro Economic Context
Principal Challenges
Smart Solutions

**P112 Opportunities**

Buildings and Environment
Digital Media
Education
Energy
Health
Transport

**P116 Current and Future Smart Integration**

**P117 Summary of Hot Spots by Theme**

**P118 Smart City Projects in Other Cities in South Korea**

## Key:

This key explains the broad parameters that were used in calculating the relative timeline, size, and technology levels deployed per each opportunity that follows:

| Timelines | Size | Technology |
|---|---|---|
| **Immediate**<br>Less than 18 months | **Small**<br>Less than £50 million | **Low**<br>Existing/proven technology |
| **Mid term**<br>18 months to 3 years | **Medium**<br>£51 million to £200 million | **Medium**<br>Technology in introduction |
| **Long term**<br>Over 3 years | **Large**<br>Over £200 million | **High**<br>Technology to be introduced |

**UKTI Contact in South Korea:**
Douglas Barrett
Head of Trade & Investment
Douglas.Barrett@fco.gsi.gov.uk

**www.ukti.gov.uk/southkorea**

# Demographic and Macro Economic Context

**Brief Overview of Seoul**

- Seoul is located in the middle of several major northeast Asian metropolises such as Tokyo, Beijing, Shanghai and Taipei with a total area of 605.4 $km^2$. The city is divided into 25 districts, and the business area consists of 6 districts.
- Seoul is building a digital media city equipped with the latest broadband information and communications infrastructure so as to attract the world's most advanced information media companies.
- The City Government plans to designate an international financial zone and provide local and foreign financial companies that move into the zone with a variety of support, including various infrastructure and tax exemptions and reductions.

## Demographic Profile

- Population of Seoul is likely to decrease to 9.7 million by 2025 from 10.5 million in 2009 due to the nation's low birth rate.
- Another reason for the decline in Seoul population is due to migration from Seoul to neighborhood new towns such as Kyunggi Province.
- More than 97% of Seoul residents are Korean.
- 14% of the population is above 65 years old. The ratio will increase to 15% in 2026.

## Economic Profile

- GDP per capita of Seoul was USD13,741 in 2000 and increased to USD20,265 in 2010.
- Wholesale trade hires the biggest proportion of the city's population in Seoul, accounting for 66% of total population in 2009.
- Seoul excels in the business services related industry with 14% of its total labour force employed in approximately 35,000 companies.

## Principal Challenges

| | |
|---|---|
| Buildings & Environment | • Relies heavily on relationships and networks.<br>• Domestic competition and local recognition. |
| Digital Media | • The Korean government has been very proactive towards smart initiatives, but the fact that the country uses several wireless standards such as CDMA, UMTS, LTE and WiMAX has led to scale issues. |
| Education | • Too much focus on exams and lack of creative learning environment.<br>• Massive spending and reliance on private extra-curricular education.<br>• Increasing inequality of educational opportunities by income level. |
| Energy | • South Korea has a reliable power network with a high SAIDI index. The key issue is to make the electricity network more intelligent and prepare the power network to integrate future technologies like EV, RE, demand response, etc. |
| Health | • Government initiatives to build medical device cluster and rapidly ageing population. Central government's policy to encourage business relocation to outside Seoul Metropolitan area and focus on medical electronic industry. |
| Transport | • Worsening congestion both in public transport and on road.<br>• Public transport ridership increased by 8.1% from 2002 to 2008 and vehicle on road increased by 9.4% from 2004 to 2009. |

## Smart Solutions

| | |
|---|---|
| Buildings & Environment | • High awareness on going green and becoming sustainable.<br>• Large market translates into abundant opportunities. |
| Digital Media | • Korea has the highest mobile broadband penetration rate in the world next to Japan, and nearly all homes have high-speed broadband access.<br>• The presence of major manufacturers such as Samsung facilitate the development of smart solutions in the country. |
| Education | • Government's 'SMART Education' project launched in June, 2011.<br>• Digital textbooks, Online class & evaluation system, Cloud-computing infrastructure. |
| Energy | • Nationwide policy framework and implementation roadmap for smart grid deployment provides a top level push to smart solutions in South Korea. |
| Health | • Development of Wonju Medical Valley and availability of extensive ICT infrastructure. Wonju shall be developed as medical electronic industrial cluster. |
| Transport | • Government initiatives for smarter, greener and more efficient transport.<br>• Seoul city plans to introduce 36,000 Hybrid taxis by 2020.<br>• Number of EV charging stations is to be around 10,000 by 2020 in Seoul.<br>• Around $3 billion budget for public transport and infrastructure upgrades. |

## Buildings & Environment

# Self-sufficient buildings: A bold way forward, especially for residential sector

#71 opportunity

| | |
|---|---|
| **Key Challenge** | • Due to the nature of the South Korean construction industry and city planning, many projects are achieved through connections and relationships. Finding a competent partner is indispensable for sustainable success. |
| **Programme** | • The government has introduced the 'Two Million Green Home Initiative'. The plan is to build one million and renovate an additional one million homes to meet stringent environmental and energy consumption standards by 2018. |
| **Smart Element** | • MLTM has amended the existing 'Regulations on the Standards for Housing Construction' that specifies that all multi-family housing complexes with an excess of 20 units must reduce energy consumption by at least 15%. |
| **Opportunity** | • **Roof-top landscaping, water-permeable pavements, wastewater recycling systems, water-saving toilets, paints, thermal insulation materials, flooring materials, soundproof materials between floors, balcony windows, heat recovery ventilations, geothermal heat systems, and solar heat systems.** |
| **Main stakeholder** | • Construction & Economy Research Institute of Korea (CERIK), Ministry of Land Transport & Maritime Affairs (MLTM), Public Procurement Service Korea (PPS), Ministry of Knowledge Economy (MKE). |

| Timelines | Size | Technology |
|---|---|---|
| Aims to achieve by 2025 | Large | High |

## Buildings & Environment

# Sustainable building designs and consulting: Focus on architectural and engineering (A&E) service

#72 opportunity

| | |
|---|---|
| **Key Challenge** | • The A&E service industry in Seoul is highly competitive. According to estimates, with 9,787 architectural design and engineering firms and 10,590 registered architects in South Korea. |
| **Programme** | • The South Korean government revised the service sector related policy, "Industrial Development Act" in 2009 and began to foster the A&E industry as a part of knowledge-intensive service industry. |
| **Smart Element** | • Architectural design and project management firms have become increasingly conscious of incorporating environmental and green considerations in newly initiated city-wide housing development projects in South Korea. |
| **Opportunity** | • **Integration of smart grid into project initiation, development, and management, green building materials.** |
| **Main stakeholder** | • Public Procurement Service Korea (PPS).<br>• Architecture & Urban Research Institute (AURI). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Medium to high |

## Digital Media
## Mandatory Near Field Communications (NFC)

#73 opportunity

| | |
|---|---|
| **Key Challenge** | • Near Field Communications (NFC) have long been used in Japan in order to allow consumers to pay for services with their mobile phones. Korea has mandated that all smartphones in Korea have NFC chips to stimulate the ecosystem. |
| **Programme** | • The government plans calls for the installation of 300,000 NFC-enabled payment kiosks in addition to the handset requirement within the next 18 months. The goal of this initiative is to create a US$1 billion industry and 5,700 jobs by 2016. |
| **Smart Element** | • NFC is currently used for payments but stimulating the industry will also allow new applications such as ID card, e-keys etc. |
| **Opportunity** | • **Mobile payment, smart wallet.** |
| **Main stakeholder** | • Ministry of Knowledge Economy.<br>• SK Telecom, financial institutions, chipset vendors. |

| Timelines | Size | Technology |
|---|---|---|
| Medium | Large | Low |

## Education
## ‘Smart’ Education Project launched in June 2011

#74 opportunity

| | |
|---|---|
| **Key Challenge** | • Fast changing learning environment due to development of new IT infrastructure.<br>• Cramming education system focusing heavily on written exams and teaching by rote.<br>• Increasing inequality of education opportunities by income and social level. |
| **Programme** | • Development and application of digital textbook in schools.<br>• Expansion of online classes and development of online evaluation systems.<br>• Set-up of wireless internet network for cloud-computing learning content. |
| **Smart Element** | • Individual e-reader with digital textbooks substituting paper books.<br>• Online extra-curricular courses using IPTV.<br>• Setup of wireless internet network for clouding-computing learning content. |
| **Opportunity** | • **National level project investing more than USD 22 billion by 2015.**<br>• **E-content and IT infrastructure for smart learning.** |
| **Main stakeholder** | • Ministry of Education, Science and Technology.<br>• Office of Educations at provincial level (9 provinces, 7 metropolitan cities).<br>• Korea Education & Research Information Service. |

| Timelines | Size | Technology |
|---|---|---|
| Long term | Large | High |

## Energy
## Nationwide Smart Grid Deployment

#75 opportunity

| | |
|---|---|
| **Key Challenge** | • Controlling electricity demand and reducing peak power requirement.<br>• Preparing network for integration of technologies such as RE, EV, demand response etc. |
| **Programme** | • A nationwide smart grid programme has been launched in three phases: Development of a smart grid test bed in Jeju island by 2012, Expansion of smart grid into metropolitan cities by 2020, and completion of a nationwide smart grid by 2030. |
| **Smart Element** | • Grid automation to enhance reliability, power management by customers and demand control, enabling smart transport through electrical vehicles, integrating renewable energy to the grid, smart electricity services to customers such as choice of electricity rates and selling power back to the grid. |
| **Opportunity** | • **A total of USD 7.18 billion would be invested in the nationwide smart grid by 2030. Approximately, USD 358 million per year will be spent until year 2016 with an additional USD 2.1 billion investment by 2020. The remaining investment will be made by 2030.** |
| **Main stakeholder** | • Ministry of Knowledge and Economy.<br>• Korea Smart Grid Institute.<br>• Total 168 companies including KEPCO, SK, LG, KT, Samsung, Hyundai, GS Caltex. |

| Timelines | Size | Technology |
|---|---|---|
| Short, medium & long term | High | High |

## Health
## Wonjun Medical City

#76 opportunity

| | |
|---|---|
| **Key Challenge** | • Relocate businesses to outside Seoul Metropolitan area and focus on medical electronic industry for rural areas. |
| **Programme** | • Wonjun Medical City. |
| **Smart Element** | • Development and commercialisation of various smart medical devices ranging from remote patient monitoring, telehealth, telemedicine and elderly care. |
| **Opportunity** | • **Smart applications for elderly care and test bed for new technology.** |
| **Main stakeholder** | • Ministry of Health & Welfare.<br>• Ministry of Education, Science and Technology.<br>• Industry Investment Association. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to long term | Large | Medium to high |

## Health
## Assisted Living Facilities for elderly

#77 opportunity

| | |
|---|---|
| Key Challenge | • Ageing population that demand solutions for elderly to live a better quality life. |
| Programme | • Immediate need to identify and develop technologies for next generation properties with assisted living facilities. |
| Smart Element | • Home / Community-based care that includes assistive technology that is elder-care enabled to foster independent living, Chronic disease management for remote monitoring of patients, Integration of care through telemedicine. |
| Opportunity | • **Remote patient monitoring, telehealth, telemedicine, smartphone applications, assisted living technologies.** |
| Main stakeholder | • Ministry of Health & Welfare. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to mid term | Large | Medium |

## Transport
## Electric Vehivle (EV) Monitoring Programme in Seoul, Youngkwang and Jeju

#78 opportunity

| | |
|---|---|
| Key Challenge | • Increasing demand on EV but lack of infrastructure and technological development compared to other leading countries such as Japan and Europe. |
| Programme | • 5 Target EVs; EV Bus, NEV, UEV, AEV, and Remodelled models are being tested.<br>• Focus to test/evaluate EV power system, battery, body system, chassis system and HVAC. Secure manufacturing capability for EV parts materials. |
| Smart Element | • Using CDMA & GPS technologies, it will be possible to monitor driving behaviour and recharging information for EVs.<br>• Central control system for EV and EV components. |
| Opportunity | • **Promote car sharing service with EVs, Battery rental service.**<br>• **3 different supply-models of EV; Seoul – EV Taxi/Bus, Battery Youngkwang – NEV, Jeju – Rent car.** |
| Main stakeholder | • Ministry of Knowledge & Economy; Focus on EV development.<br>• Ministry of Environment: Focus on E-Mobility (Develop profit models). |

| Timelines | Size | Technology |
|---|---|---|
| Short term | Medium | High |

# Current and Future Smart Integration

| | Remarks | Level |
|---|---|---|
| Macro Environment | • Population in Seoul is expected to decrease slightly by 2025 but the percentage of the population over 65 years old will increase.<br>• The economy has expanded for the last decade and is expected to grow further. | |
| Smart Opportunity | • Smart solutions relating to sustainability would have opportunities.<br>• Local Korea companies may lead on projects with opportunities for UK companies to partner with them. | |
| Fit with Capability | • The most advanced smart technologies and solutions available in UK would fit in South Korea and its capital Seoul.<br>• South Korea can be more advanced than UK in some areas. | |
| Timeframe | • Smart city projects have started in some cities in South Korea including Seoul.<br>• New technologies and solutions can be expected near future. | |
| Overall Attractiveness | • Opportunities are high in Seoul, as many projects are ongoing, and a similar level of smart solution can be applied. | |

# Summary of Hot Spots by Theme

| Theme | Current status | Smart outlook | Timeframe |
|---|---|---|---|
| Buildings & Environment | Key projects are led by the government. | With energy sufficiency building initiatives and programs in place. | Immediate |
| Digital Media | Mobile Penetration > 100%, household broadband penetration >95%. | High speed fixed and wireless networks are already in place which has allowed smart services over next-generation networks. | Immediate |
| Education | Fast changing learning environment due to new IT infrastructure. | E-content and IT infrastructure for smart learning. | Long term |
| Energy | Total energy consumption has been increasing. | Smart grid to use energy more efficiently. | Mid term |
| Health | Rapidly ageing population demands smart applications for this growing sector. | Smart application for elderly and vibrant cluster of medical electronic companies. | Immediate to long term |
| Transport | Lack of EV infrastructure and technological development. | Car sharing service with EVs, Battery rental service. | Short term |

# Smart City Projects in Other Cities in South Korea Present Demonstration of Future-City models by the Government with private enterprises

## Project Overview

- Ministry of Knowledge Economy and Ministry of Land, Transport and Maritime affairs announced the plans for demonstration of U-Eco city in February 2009 this has been expanded to the Smart city plan in 2011.
- 38 local governments promote development of Smart city concepts and central government plans to establish regulations and financial-support.
- There are 2 demonstration towns named, Songdo in Inchun and Dongtan in Hwasung. Jejoo Island has been developing as a testbed of Smart grid and was promoted to a Smart city.
- UK companies may participate in the projects to demonstrate their expertise.

## Songdo, Inchun

- KT(Korea Telecom) and Cisco plan to design, build and operate the Smart city in Free Economic Zone in Inchun.
- Songdo has been selected as a demo Smart city and will have USD$3.1 million invested by 2012.

## Dongtan, Hwasung

- Dongtan new town was built in 2008 and operated with 'Smart solutions'.
- Providing services with IT technologies at such as real time traffic information, managing water supply, security, parking and air pollution information.

## Jejoo Island
### Based on Smart grid

- Gujwa-eup in Jejoo Island has 6,000 house holds.
- Over $200 million due to be invested by 2013.
- 168 companies to participate in this project.

# Taiwan

# Taiwan

**P121 Context**

Demographic and Macro Economic Context
Principal Challenges
Smart Solutions

**P123 Opportunities**

Buildings and Environment
Digital Media
Education
Energy
Health
Transport

**P128 Current and Future Smart Integration**

**P129 Summary of Hot Spots by Theme**

**P130 Smart City Projects in Other Cities in Taiwan**

## Key:

This key explains the broad parameters that were used in calculating the relative timeline, size, and technology levels deployed per each opportunity that follows:

| Timelines | Size | Technology |
|---|---|---|
| **Immediate**<br>Less than 18 months | **Small**<br>Less than £50 million | **Low**<br>Existing/proven technology |
| **Mid term**<br>18 months to 3 years | **Medium**<br>£51 million to £200 million | **Medium**<br>Technology in introduction |
| **Long term**<br>Over 3 years | **Large**<br>Over £200 million | **High**<br>Technology to be introduced |

**UKTI Contact in Taiwan:**
Stephen Metti
Head of UK Trade & Investment
Stephen.Metti@fco.gsi.gov.uk

**www.ukti.gov.uk/taiwan**

# Demographic and Macro Economic Context

**Brief Overview of Taipei City**

- Taipei City, the capital of Taiwan, is situated at the northern tip of Taiwan Island and is about 25km Southwest of Keelung, its port on the Pacific Ocean.
- One of the most progressive and modern cities in the world, Taipei City is also the cultural center for one of the oldest and richest cultures in Asia.
- It is the largest city in Taiwan, and one of the most densely populated urban areas in the world.
- The city has a land area of approximately 271.8km$^2$ which accounts for a mere 1% of Taiwan's total land area of 36,188 km$^2$.
- The city is composed of 4 major ethnic groups: Hoklos, Mainlanders, Hakkas and aborigines.

## Demographic Profile

- Taipei City is home to an estimated 2.65 million people, of which 48% are male and 52% female.
- The city has a population density of 9,738 persons per km$^2$.
- The population of Taipei City has been decreasing in recent years while the population of the adjacent New Taipei has been increasing.

## Economic Profile

- Taipei's GDP is estimated to be US$ 260 billion while GDP per capita is US$ 48,400, and the second highest in Asia behind Tokyo.
- In 2010, Taiwan was the 4th fastest growing economy in the world, with a GDP improvement rate of 10.8%.
- Taiwan's electronics and tech products now lead the country's exports and are forecasted to rise 3-5% in 2012.
- The services sector is by far the largest contributor to GDP with 66.3%.

## Principal Challenges

| | |
|---|---|
| Buildings & Environment | • The community requires more effort to educate on sustainable building technologies, which has a slow adoption rate, especially within the private sector. |
| Digital Media | • Mobile data services have been priced high compared to other developed Asian countries and the connection can be broken up from time to time. However, penetration is increasing along with the popularity of smart phones and devices. |
| Education | • An issue being faced in Taiwan's education system is the inadequate exposure of teachers to innovative content, supporting techniques and software, causing a dilution of effectiveness of technology led teacher education capability.<br>• Research in 2011 showed that Taiwan's English competitiveness is weakening. |
| Energy | • Modernise a mature and reliable energy infrastructure to further enhance energy efficiency and network reliability. |
| Health | • Rise of the aging population. In 2009, the population of the elders aged over 65 was 2.45 million, 10.63% of total population. By 2025, the ratio of senior citizen is expected to hit 19.8%, creating extra challenges on how to support senior citizens. |
| Transport | • High congestion caused by increased population density on rail and road, lack of advanced traffic management tools to monitor and direct traffic, and a railway system that requires major upgrades. |

## Smart Solutions

| | |
|---|---|
| Buildings & Environment | • Advancement in regards to building technologies and development.<br>• Continuous R&D through Taiwan Building Technology Center (TBTC). |
| Digital Media | • Taipei is dedicated to become THE smart city, particularly in public services, such as e-government, healthcare, transport and tourism. The city has been commended by international organizations for its innovation in public services through the use of technology. In 2011 Taipei was awarded the Service Innovation Award by FutureGov. |
| Education | • To expand the application of Digital Education and E-Learning in formal education and lifelong learning so that talent and human resources can be effectively nurtured and utilised, raising the quality and skill level of Taiwan's human resources. |
| Energy | • With a strong information technology, electronics and communication infrastructure, Taiwan is well positioned to become a global leader in smart energy solutions. |
| Health | • Healthcare smart solutions is made available through its extensive ICT infrastructure and strengths in end product manufacturing. For example, Tunstall had successfully introduced EverCare remote home care systems to the Taiwan market in 2008. |
| Transport | • Increased population density in Taipei has put pressure on the green technology Transport and policies to reduce air pollution and promote efficiency and safety for all modes of public transport and to accelerate the national economy while promoting sustainable development. |

## Buildings & Environment
## Energy Efficiency Ventilation System

#79 opportunity

| | |
|---|---|
| Key Challenge | • Difficult to implement on existing buildings as retro-fitting often does not take place<br>• Difficulty in adapting the system in existing buildings. |
| Programme | • Review ventilation system in the context of achieving energy efficiency, good in door air quality, and less reliance on heating, ventilation and air conditioning (HVAC) usage. |
| Smart Element | • 'Intelligent' glass that provides heat insulation and power generation.<br>• 'Intelligent' equipment and technology that can implement an appropriate ventilation design for indoor air and heat flows. |
| Opportunity | • **Ventilation system consultancy.**<br>• **Expertise on implementing natural ventilation and materials involved are in high demand.** |
| Main stakeholder | • Architecture and Building Research Institute, Ministry of the Interior, Taipei, Taiwan (ABRI). |

| Timelines | Size | Technology |
|---|---|---|
| Mid to long term | Medium | High |

## Buildings & Environment
## Energy Efficiency Monitor and Management System

#80 opportunity

| | |
|---|---|
| Key Challenge | • Outlining energy efficiency management solutions and lack of expertise and product availability in the market. Private sector does not know how to implement this concept. |
| Programme | • Government subsidy available for any building energy efficiency projects.<br>• Taiwan has established some intelligent building R&D centres with government and academic backup. |
| Smart Element | • Which is in line with the government's determination to pursue its "energy conservation, carbon reduction" policy. |
| Opportunity | • **The introduction of international standards, software and system integration equipment that can improve and monitor energy efficiency in all new and existing buildings.** |
| Main stakeholder | • Architecture and Building Research Institute (ABRI), Ministry of the Interior, Bureau of Standards, Ministry of Economic Affairs. |

| Timelines | Size | Technology |
|---|---|---|
| Mid term | Medium | Medium |

## Digital Media
### TPE-Free (2012) / Optical Fiber Network (2015)

#81 opportunity

| | |
|---|---|
| Key Challenge | • In 2011 the city government of Taipei launched its TPE-Free municipal Wi-Fi service in public areas (Hotspots) to promote broadband use in the city, recognizing tariffs are expensive and uptake lags other major cities. |
| Programme | • The government plans calls for free Wi-Fi access to be provided to the entire Taipei metropolitan area by 2012.<br>• A BOT project worth of US$1bn for optical fiber network is awarded to a local consortium in January 2012. By 2015, 80% of the city will be covered by the network. The operation contract is for 25 years. |
| Smart Element | • Having high-speed broadband connections in the whole city will not only encourage mobile broadband use but will also help adjacent industries such as machine-to-machine communications, retail, and logistics tracking. |
| Opportunity | • **M2M, telematics, logistics.** |
| Main stakeholder | • Taipei City Government, Tai Tung Communication (BOT contract winner). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to long term | Medium | Medium |

## Education
### Digital Education and E-Learning

#82 opportunity

| | |
|---|---|
| Key Challenge | • Due to the increasing pressure on the formal educational system at all levels and global trends of educational reform, Taiwan has urged educational change in order to sustain the overall quality of education and national competitiveness. |
| Programme | • Taiwan e-Learning and Digital Archives Program (TELDAP) to improve quality of teaching and learning and provide for more flexibility in student learning. |
| Smart Element | • The development of Internet and computer technology allow the delivery of teaching materials electronically and remotely, provides students, professionals and citizens with anytime/anyplace independent learning environment. |
| Opportunity | • **The development of interactive E-Learning tools, software and programmes.**<br>• **Enhancement of Digital Education for example via broadband interactive TV.** |
| Main stakeholder | • Ministry of Education (MOE). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to long term | Medium | Medium |

## Energy
## Taiwan Advanced Metering Infrastructure Project

#83 opportunity

| | |
|---|---|
| Key Challenge | • Prepare the foundation of a smart grid in the country by testing and installing smart meters. |
| Programme | • The project was initiated in 2010 by Ministry of Economic Affairs promoting smart meter installations locally while forming related regulations. |
| Smart Element | • Integration of smart meters to the grid, meter data management system, home area network meter data support. |
| Opportunity | • **Post the demonstration phase which would involve nearly 700 smart meters and testing of different communication technologies, Taiwan would replace nearly 1 million conventional meters with smart meters by 2015.** |
| Main stakeholder | • Ministry of Economic Affairs.<br>• eMeter, Bureau of Energy, MOEA. |

| Timelines | Size | Technology |
|---|---|---|
| Mid term | Medium | High |

## Health
## Tele-health

#84 opportunity

| | |
|---|---|
| Key Challenge | • Significant increase in elderly patients utilizing healthcare infrastructure, in addition of declining young workforce. Innovative devices are needed for feature convergence especially in patient monitoring area. |
| Programme | • Healthcare Innovating Service Program – 2008.<br>• Senior Citizen U-Care Flagship Program. |
| Smart Element | • Integration of ICT, homecare monitoring systems and business model. |
| Opportunity | • **Homecare/remote patient monitoring, telehealth, telemedicine, Smartphone applications, assisted living technologies, information security.** |
| Main stakeholder | • Ministry of Economics Affair, Ministry of Health, Industrial Technology Research Institute, Institute for Information Industry. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to long term | Medium | Medium to high |

# Transport
## Green Transport

#85 opportunity

| | |
|---|---|
| **Key Challenge** | • Taiwan is facing an increase in air pollution and high carbon emissions caused by the millions of scooters and public transport that are lacking green efficiency. |
| **Programme** | • The Ministry of Transport and Communications (MOTC) is promoting sustainable green transport and tourism, strengthening energy conservation methods and carbon reducing efforts. |
| **Smart Element** | • Promoting energy conservation and carbon reducing during lifecycle of transport infrastructure. |
| **Opportunity** | • **This presents the opportunity for the supply of hybrid & electric vehicles, alternative low emission modes of transport, and a means for promoting green solutions and strategies, and design for overall green transport planning for low carbon cities.** |
| **Main stakeholder** | • Ministry of Transport and Communications (MOTC). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Medium |

# Transport
## Intelligent Transport Systems (ITS)

#86 opportunity

| | |
|---|---|
| **Key Challenge** | • In order to meet the growing challenges of increasing traffic congestion in Taipei, Intelligent Transport Systems are required to further improve efficiency and safety. |
| **Programme** | • The Ministry of Transport and Communications (MOTC) has identified the need to integrate the freeway, expressway, and major provincial, county, and city highway network services to provide a free flow of transport. |
| **Smart Element** | • Advanced Traffic Management Systems (ATMS) for example disseminates real-time traffic information to the public in order to reduce the impact of accidents, stalled vehicles, adverse weather, or congestion. |
| **Opportunity** | • **Intelligent solutions would require the supply of Closed Circuit Television (CCTV) Cameras, Automatic Vehicle Location Systems (AVLS) and Automatic Incident Detection (AID) Cameras for example.** |
| **Main stakeholder** | • Ministry of Transport and Communications (MOTC). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Medium |

# Transport
## Intelligent Railway Solutions

#87 opportunity

| | |
|---|---|
| **Key Challenge** | • The increase in rail passengers in Taipei has meant that optimisation of rail networks is crucial in satisfying the increase in consumer demand for more efficient and safer services. |
| **Programme** | • The Ministry of Transport and Communications (MOTC) has identified the need for integrated service management solutions and predictive analytic tools to help model and manage optimal routes, schedules and capacity in real-time. |
| **Smart Element** | • Traffic prediction tools that allow operators to anticipate and react to congestion, identify breakdowns before they occur to ensure a smoother, safer and more reliable experience for customers. |
| **Opportunity** | • **Smart solutions such as, Maintenance Management Information System (MMIS), remote monitoring and telemetry systems, signalling systems, ERTMS (European Rail Traffic Management System), and Fault Management System (FMS).** |
| **Main stakeholder** | • Ministry of Transport and Communications (MOTC).<br>• Department of Rapid Transit Systems (DORTS), Taipei City Government. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Medium |

# Current and Future Smart Integration

| | Remarks | Level |
|---|---|---|
| Macro Environment | • With its strategic location, Taipei is no doubt the gateway to mainland China for global enterprises from around the world.<br>• It is considered a developed city and has a metropolitan population of over 6.9 million. | |
| Smart Opportunity | • Taiwan has the infrastructure and capabilities of smart/integrated solutions to further compliment advancing opportunities across all sectors. | |
| Fit with Capability | • In 2010, Taiwan was tied for No. 29 in global accumulated FDI with about US$111 billion currently. The market already has advanced technology to support large scale implementations. | |
| Timeframe | • There are several smart initiatives already in place and in the pipeline.<br>• The timeline of each project varies and may take longer than anticipated. | |
| Overall Attractiveness | • The government offers foreign firms unrestricted trade-related capital flows and abolished 50% foreign ownership limit.<br>• Investment incentives for monies put to work in several areas, including energy conservation and emerging industries. | |

# Summary of Hot Spots by Theme

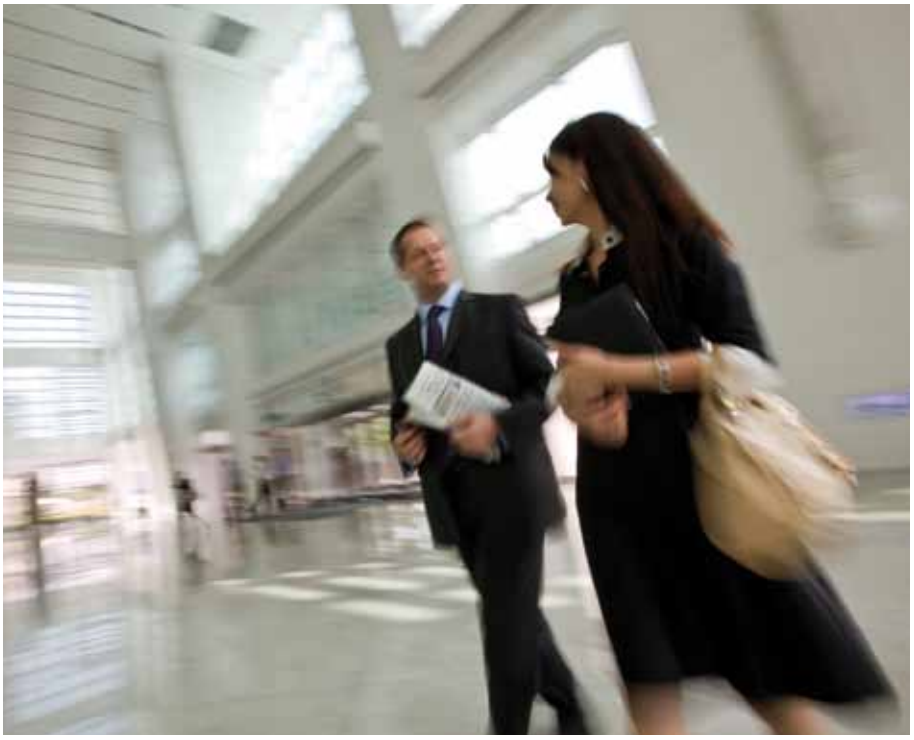
| Theme | Current status | Smart outlook | Timeframe |
|---|---|---|---|
| Buildings & Environment | Lack of compulsory standards and availability of competent R&D centres and regulatory bodies support. | Energy efficiency natural ventilation system, energy efficiency monitor and management system. | Mid to long term |
| Digital Media | Mobile Penetration > 100%, household broadband penetration >70%. | 4G wireless networks should be deployed by 2012 and Optical Fiber Network by 2015 creating new opportunities. | Immediate to mid term |
| Education | Lack of innovative content/ methods in language training and insufficient information with urban-rural gap and the digital divide. | Introduction of content, new materials and techniques, Implementation of Digital Education and E-Learning to facilitate skills cultivation. | Immediate to long term |
| Energy | A mature and reliable energy infrastructure. | Emerge as a global leader of smart energy solution providers. | Medium |
| Health | Clear vision and action plan from Government to innovate health care service program. | Total healthcare delivery to all citizen through smart/ mobile technologies. | Immediate to long term |
| Transport | Demand for efficient transport solutions to cope with rising population, severe traffic congestion and accidents. | Intelligent Transport Systems focusing on energy efficiency and lowering of carbon emissions. | Immediate to long term |

# Smart City Projects in Other Cities in Taiwan

## Future Smart Green Cities/Initiatives by Government with private enterprise collaboration

### Project Overview

- The Taiwanese government has included the “Smart Green City” in its list of four main rising intelligence industries.
- It has budgeted US$ 105.7 million to be used in this sector from 2010 to 2015 which aims to spur investment value of more than US$ 937.8 million in related industries while cutting carbon emissions by 3.82 million tons and creating 243,000 jobs.
- Kaohsiung, Taichung and Hsinchu are the 3 cities that will be of SMART city potential.
- UK companies may participate in the projects to demonstrate their expertise.



### Kaohsiung City

- Kaohsiung is the second largest city in Taiwan, with a population of 3.5 million.
- Plan to lower $CO_2$ and energy use by integrating the city’s MRT, LRT, BRT and shuttle bus systems by deploying more hydrogen buses, solar powered bus stops and EV charging stations.
- Plan to build the city into a model “green” low-carbon city, via increased greenery, recycling, and collection and reuse of agricultural waste transformation along with green vehicles.

### Taichung City

- Taichung is the third largest city in Taiwan, with a population of 2.9 million.

### Hsinchu City

- Hsinchu is home to an estimated population of 411,981.
- Hsinchu Science and Technology Park was established in 1978 to attract high tech investment in Taiwan to cater for high quality R&D, production, work, life and recreation.
- New push for upgrades to turn it into a global manufacturing and R&D center of high-end products.

# Thailand

# Thailand

**P133 Context**

Demographic and Macro Economic Context
Principal Challenges
Smart Solutions

**P135 Opportunities**

Buildings and Environment
Digital Media
Education
Energy
Health
Transport

**P141 Current and Future Smart Integration**

**P142 Summary of Hot Spots by Theme**

## Key:

This key explains the broad parameters that were used in calculating the relative timeline, size, and technology levels deployed per each opportunity that follows:

| Timelines | Size | Technology |
|---|---|---|
| **Immediate**<br>Less than 18 months | **Small**<br>Less than £50 million | **Low**<br>Existing/proven technology |
| **Mid term**<br>18 months to 3 years | **Medium**<br>£51 million to £200 million | **Medium**<br>Technology in introduction |
| **Long term**<br>Over 3 years | **Large**<br>Over £200 million | **High**<br>Technology to be introduced |

**UKTI Contact in Thailand:**
Bradley Jones
Director of UK Trade & Investment
Bradley.Jones@fco.gsi.gov.uk

# Demographic and Macro Economic Context

**Brief Overview of Bangkok**

- Bangkok is the capital and largest city of Thailand.
- It is one of the major business and financial centers in South East Asia.
- Bangkok has an established reputation as a cultural and tourist attraction.
- Bangkok has more than 9.1 million people in a space of 1,569 km$^2$, and so is one of the most densely populated cities in the world. In Bangkok's metropolitan area 12 million people live in 7,761 km$^2$ area.

## Demographic Profile

- Bangkok has a high population density of 5,800 people/km$^2$.
- Bangkok has a large influx of domestic and foreign immigrants. More than a quarter of the resident population are migrant Thais.
- Chinese are the largest minority with 250,000 people, followed by Indians.

## Economic Profile

- Bangkok is one of the largest city economies in South East Asia.
- Bangkok has become increasingly important as a location for regional headquarters, with many multi-nationals locating regional manufacturing and operation centres in Bangkok and region.
- Bangkok is connected with five other provinces which enables easy expansion of operations to a wider market.

## Population

## Principal Challenges

| | |
|---|---|
| Buildings & Environment | • Shortage of skilled technical personnel especially in operations and maintenance.<br>• Inadequate enforcement of existing environmental regulations. |
| Digital Media | • Political disagreements has led to the Thai government being one of the last in the Asia Pacific region to release 3G licenses.<br>• Greater Bangkok heavily affected by flooding in late 2011 damaging communications infrastructure, and impacting chip manufacture market globally. |
| Education | • Education standards are below international standards. Challenge to improve the education system, teacher skills and student education levels.<br>• Competency in English is low, preventing absorbing advanced technology efficiently. |
| Energy | • Thailand has an ageing electrical grid with little investments made over the past 40 years to restructure/modify it. To meet increasing consumer demand, avoid blackouts and integrate renewable energy and electric vehicles to the grid, Thailand needs to implement smart solutions in its power sector. |
| Health | • Healthcare delivery to isolated areas. Remote areas in Thailand makes it challenging to deliver healthcare. Healthcare workers in rural areas are generally ill-informed and under-trained due to geographical limitation. Lack of access to pharmaceuticals also an issue. |
| Transport | • Lack of public transport infrastructure which cause heavy private traffic on road.<br>• Severe traffic congestion in Bangkok and issues with environmental pollution. |

## Smart Solutions

| | |
|---|---|
| Buildings & Environment | • Retrofitting of existing buildings is expected to happen as most office buildings were built in the 80s and 90s. The installation of environmentally sustainable features or technologies is expected to be included during the process.<br>• Significant amount of new building work going on across Bangkok. Opportunity for green building standards. |
| Digital Media | • Despite a low income and limited broadband penetration, the ubiquity of mobile services are causing new industries to develop such as mobile payments and social networking services. |
| Education | • Utilising technologies which enable students to learn required skills and knowledge easily.<br>• High quality education programmes to enhance skills and knowledge. |
| Energy | • Financial support for solar energy and smart grid, one of the better developed infrastructure in ASEAN region, pro investment policies and a strong export industry. |
| Health | • Thailand has laid out a 2020 ICT Masterplan to create a Smart Thailand by transforming e-government to i-government, focusing on the integration of government agencies and public and private sector services. One of the key areas is to develop smart healthcare delivery services for rural locations. |
| Transport | • Mass transport infrastructure to alleviate traffic congestion on road.<br>• Low emission vehicles to reduce health and environmental impacts. |

## Buildings & Environment
## Integrated Facilities Management (IFM) Services

#88 opportunity

| | |
|---|---|
| Key Challenge | • Cost conscious and price sensitive, with little awareness on value added of IFM services. |
| Programme | • Thailand 20-Year Energy Efficiency Development Plan (2011-2030).<br>• Thai Green Building Institute (TGBI) is expected to launch Thailand's own green building standards. |
| Smart Element | • Adaption of Computer Aided Facility Management (CAFM) software that are able to operate facilities efficiently, especially in term of energy and cost efficiency.<br>• The integration between various systems or equipment operating within the facilities would results in easy monitoring of energy usage. |
| Opportunity | • **Industry surveys indicate that Bangkok has 1,600 buildings with floor space greater than 2,000 square meters, with IFM opportunity in healthcare, commercial, industrial and retail sectors.** |
| Main stakeholder | • Thailand Facility Management Association (TFMA).<br>• Building owners, tenants, and facility managers. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Small | Low |

## Buildings & Environment
## Wastewater Treatment System

#89 opportunity

| | |
|---|---|
| Key Challenge | • No comprehensive measures for wastewater treatment development and management as well as stringent regulations currently.<br>• Competitive pricing with high after-sales support expectation. |
| Programme | • 20-year policy and prospective plan for enhancement and conservation of National Environment Quality (1997-2016) and Millennium Development Goals (MDG) to provide sustainable environmental protection to the country. |
| Smart Element | • Advanced wastewater treatment that has pollution prevention technologies and renewable energy technology. |
| Opportunity | • **Local capability to produce high technology is limited. As such, the market is relatively open to business opportunity of foreign imports of products and services.**<br>• **Foreign manufacturers have a good reputation for their quality and advanced technology in the field of water resources in Thailand.** |
| Main stakeholder | • Ministry of Natural Resources and Environment.<br>• Industrial Waste Management Division, Department of Industrial Works, Ministry of Industry. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to mid term | Medium | Medium |

## Digital media
### 3G Network Deployment

#90 opportunity

| | |
|---|---|
| Key Challenge | • Thailand is one of the last markets in Asia to deploy 3G services which has damaged the competitiveness of the city. |
| Programme | • The political deadlock that has long-haunted the city seems to be abating with the election of Ms. Yingluck Shinawatra and full commercial services are expected to be fully introduced in 2012. |
| Smart Element | • Having high-speed broadband connections in nearly every premise in Thailand will allow for future smart applications such as smart grids, telecommuting and connected home applications to work more efficiently and will also greatly increase broadband usage in the city. |
| Opportunity | • **Smart – grid applications, remote monitoring, telehealth, telecommuting, connected home.** |
| Main stakeholder | • Ministry of Information and Communication Technology, and Ministry of Science, Technology and Environment (MOSTE).<br>• The major mobile operators are AIS, DTAC, True Move. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Large | Low |

## Education
### One Tablet Per Child Project

#91 opportunity

| | |
|---|---|
| Key Challenge | • Majority of children cannot afford to buy books, and government budget is limited.<br>• Scandals of Illegal printing and sub-standard quality of books.<br>• Poor school building infrastructure; teaching quality and English language skills / learning. |
| Programme | • The government plans to handout a tablet per child. Tablet handouts will begin with students attending Prathom 1 (Grade 1) nationwide in January 2012. |
| Smart Element | • E-textbook delivers vast amount of information and knowledge to the students.<br>• The government can save text printing costs and use the budget for subsidy of tablets. |
| Opportunity | • **E-learning programme, E-books, mobile bundled access, E-examination, digital library, low cost tablet PCs.** |
| Main stakeholder | • Ministry of Education. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium to large | Low |

## Education
# Thailand Cyber University Project

#92 opportunity

| | |
|---|---|
| Key Challenge | • Increase access to education irrespective of time or location, establishing a knowledge centre to encourage life-long learning, improving and developing the quality of higher education, creating knowledge management and the sharing of educational resources among educational institutions efficiently and effectively. |
| Programme | • Thailand has carried out missions under an e-Education strategy in the second phase of the Information Technology Policy of Thailand or IT 2010 (B.E. 2544-2553) and the National Education Plan (B.E. 2545 - 2559). |
| Smart Element | • E-learning provides exchanging knowledge, innovative practices and experiences of E-learning among Thai and international educators, researchers, faculty and students. |
| Opportunity | • **E-learning programmes and technologies, e-learning facilities, media for e-learning.** |
| Main stakeholder | • Commission on Higher Education, Ministry of Education. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Low to medium |

## Energy
# Thailand National Smart Grid

#93 opportunity

| | |
|---|---|
| Key Challenge | • Thai electric grid has seen little improvements over the past 40 years. The grid needs to be modernised to meet the challenge of increasing customer demand as well as to enable integration of renewable energy and electric vehicles. |
| Programme | • Provincial Electricity Authority (PEA), one of the major utilities in Thailand would spend 400 billion Thai Baht (USD 13 Billion) to integrate electric transmission lines nationwide into a smart grid. |
| Smart Element | • Multiple smart grid elements including advanced metering infrastructure (AMI), grid automation etc. |
| Opportunity | • **Opportunities for smart meter, communication system, home energy management, grid automation suppliers as well as system integrators and consultants.** |
| Main stakeholder | • Provincial Electricity Authority (PEA). |

| Timelines | Size | Technology |
|---|---|---|
| Mid term | Large | High |

## Energy
## Thailand Renewable Energy Plan

#94 opportunity

| | |
|---|---|
| Key Challenge | • Ensuring long term energy security by utilising the renewable energy sources in the country. |
| Programme | • Thailand's Renewable Energy development plan started in 2008 and aimed at nearly 20% share of renewable energy in the power mix by 2022. |
| Smart Element | • Increased share of renewable energy in the fuel mix (solar, wind, biomass, bio fuel, waste to energy). |
| Opportunity | • **Opportunities for technology suppliers, financers to partner in the renewable energy projects.** |
| Main stakeholder | • Department of Alternative Energy Development and Efficiency (Ministry of Energy). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Large | Medium |

## Health
## Mobile Technology for TB treatment

#95 opportunity

| | |
|---|---|
| Key Challenge | • Patient monitoring and strict adherence to antibiotics treatment is critical for successful treatment and control the rise of resistance TB. Constant reminder for the patients are needed. |
| Programme | • Phone pill reminders for TB treatment. |
| Smart Element | • Auto reminder call to take drugs. |
| Opportunity | • **Auto reminder for medicine, auto billing applications and mobile healthcare news update.** |
| Main stakeholder | • (Pilot Project) – Chiang Mai Public Health Department, Ministry of Public Health. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to mid term | Medium | Low to medium |

## Health
## eLearning for Healthcare Professional

#96 opportunity

| | |
|---|---|
| Key Challenge | • Rural healthcare workers are generally ill-informed and under-trained due to geographic limitation. The process and logistics involved to train these workers are generally time-consuming and ineffective. |
| Programme | • eLearning for Healthcare Professional. |
| Smart Element | • Virtual training with enriched content that breaks the geographic limitations. |
| Opportunity | • **Telehealth and telemedicine.**<br>• **Training contents for eLearning applications.** |
| Main stakeholder | • Rhamkhamhaeng University, Sukhothai Thammatirat University, Rajabhat Suan Dusit University, Assumption University, Mahidol University, Suan-sunandha Rajabhat University, and the Asian Institute of Technology of Thailand. |

| Timelines | Size | Technology |
|---|---|---|
| Mid to long term | Medium | Medium |

## Transport
## New Rapid Mass Transport Network

#97 opportunity

| | |
|---|---|
| Key Challenge | • Heavy traffic congestion in the metropolitan area in Bangkok cause physical and mental stresses as well as air pollution in the city. |
| Programme | • New rapid mass transport line connecting downtown to outskirts of the city. |
| Smart Element | • Rapid mass transport infrastructure shifts people from cars to public transport reducing congestion and pollution. |
| Opportunity | • **IT Infrastructure, E-Services (One Stop Services Gateway), E-Transport planner.** |
| Main stakeholder | • Ministry of Transport.<br>• Railway Authority of Thailand. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Large | Low |

# Transport
## Skytrain and Subway Integrated fares Opportunity

#98 opportunity

| | |
|---|---|
| **Key Challenge** | • The numbers of passenger travelling by skytrain and subway is increasing rapidly. Split ticketing makes journeys more complex and time consuming. |
| **Programme** | • Bangkok Smart Card. |
| **Smart Element** | • To develop one card system for both BTS and MRT. |
| **Opportunity** | • **Online Money Top-Up.**<br>• **Smart Passenger Solutions.** |
| **Main stakeholder** | • Bangkok Mass Transit System (BTS), Bangkok Bank (BBL), Bangkok Metro Company (BMCL), Ministry of Transport. |

| Timelines | Size | Technology |
|---|---|---|
| Medium to long term | Medium | Medium |

# Transport
## Intelligent Transport System

#99 opportunity

| | |
|---|---|
| **Key Challenge** | • Traffic congestion is one of the major problems in Bangkok. Both government and private sector participants are driving improvements in the transport system. |
| **Programme** | • Intelligent Transport System. |
| **Smart Element** | • To develop Transport System in Bangkok with Technology and mobile access for passengers. |
| **Opportunity** | • **Smart Traffic Sign; Smart Taxi Stand; Smart Bus Stand; Smart Parking Building; Area Traffic Control; RTPI for Bus Rapid Transit; CCTV.** |
| **Main stakeholder** | • OTP – Office of Transport and Traffic Policy and Planning; RTP - Royal Thai Police; ETA – Expressway and Rapid Transit Authority; BMTA – Bangkok Mass Transit Authority. |

| Timelines | Size | Technology |
|---|---|---|
| Medium to long term | Medium | Medium |

# Current and Future Smart Integration

| | Remarks | Level |
|---|---|---|
| Macro Environment | • Bangkok is one of the largest cities in South East Asia with more than 9 million people.<br>• Economy has been growing fast thanks to large amount of foreign direct investment in the last decade. | |
| Smart Opportunity | • Thailand is relatively developed and more smart initiatives are planned and going to be planned in the near future. | |
| Fit with Capability | • Existing or proven smart solutions, rather than the most advanced ones by UK companies will fit the situations in Bangkok.<br>• Bangkok is open for foreign direct investment. | |
| Timeframe | • Several smart initiatives are on going or are going to launch soon.<br>• More new smart initiatives will be introduced in the near future. | |
| Overall Attractiveness | • Opportunities will be high in Bangkok because of the large market size, relative advanced technology status, openness to foreign investment and on going smart initiatives. | |

# Summary of Hot Spots by Theme

| Theme | Current status | Smart outlook | Timeframe |
|---|---|---|---|
| Buildings & Environment | Comprehensive regulations are still not in place but market demand is growing. | Likely to witness adoption of smart building or environment technologies with retro-fitting projects. | Immediate to mid term |
| Digital Media | Mobile Penetration >100%, household broadband penetration >25%. | High speed wireless networks have not fully launched and some operators are deploying fibre services at a slow pace. | Medium |
| Education | Textbook purchasing and printing are burden for low income family and government. | E-textbook may save printing cost as well as provide high quality contents. | Immediate |
| Energy | Old electricity grid which needs investments for grid modernisation. | The smart grid roadmap would lead to significant investment in smart energy solution. | Immediate |
| Health | Standardization and integration of Electronic Health Records. | Telemedicine and mobile healthcare applications through 3G technology. | Immediate to long term |
| Transport | High reliance on car due to lack of public transport infrastructure. | Mass rapid transport system will ease traffic congestion on road. | Immediate |

# Vietnam

# Vietnam

**P145 Context**

Demographic and Macro Economic Context
Principal Challenges
Smart Solutions

**P147 Opportunities**

Buildings and Environment
Digital Media
Education
Energy
Health
Transport

**P154 Current and Future Smart Integration**

**P155 Summary of Hot Spots by Theme**

**P156 Smart City Projects in Other Cities in Vietnam**

## Key:

This key explains the broad parameters that were used in calculating the relative timeline, size, and technology levels deployed per each opportunity that follows:

| Timelines | Size | Technology |
|---|---|---|
| **Immediate**<br>Less than 18 months | **Small**<br>Less than £50 million | **Low**<br>Existing/proven technology |
| **Mid term**<br>18 months to 3 years | **Medium**<br>£51 million to £200 million | **Medium**<br>Technology in introduction |
| **Long term**<br>Over 3 years | **Large**<br>Over £200 million | **High**<br>Technology to be introduced |

**UKTI Contact in Vietnam:**
Andy Ziardis
Deputy Consul General/Consul (Trade & Investment)
Andy.Ziardis@fco.gov.uk

**www.ukti.gov.uk/vietnam**

# Demographic and Macro Economic Context

**Brief Overview of Ho Chi Minh City**

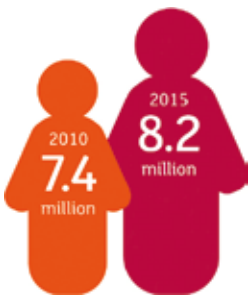
- Ho Chi Minh City is the commercial hub of Vietnam, which spans 2,095 km$^2$ with 7.4 million inhabitants, making it the most densely populated city in the country.
- Ho Chi Minh City's economy is the fastest growing in the country which contributes 20% of GDP, 28% of industrial outputs and 35% of foreign investment.
- To meet the rapid growth of the city, new urban areas are being developed with Thu Thiem and Phu My Hung as the two most prominent projects.

## Demographic Profile

- Ho Chi Minh City's population was 7.4 million in 2010 and expected to grow to 8.2 million by 2015, due to immigration and increasing birth rates.
- Being the economic and commercial centre of the country, the city faces widespread rural immigration.
- Ethnic Vietnamese accounts for 90% of the population while various other ethnic groups, majority of which are Chinese, make up the remaining 10%.

## Economic Profile

- GDP increased significantly by 4.5 times from USD 3.6 billion in 2000 to USD 19.7 billion in 2010.
- Services account for 54% of GDP, manufacturing and construction take up 45% while agriculture 1%.
- The unemployment rate was 5.1% in 2010, a decrease from rate of 5.5% in 2007.



## Principal Challenges

| | |
|---|---|
| Buildings & Environment | • Lack of enforcement despite having stringent regulations.<br>• Demand mainly from new projects with very little coming from the retro-fitting market. |
| Digital Media | • Low disposable incomes and a lack of advertising from state-owned telecommunication companies has lead to a lack of mobile broadband adoption. |
| Education | • The education system is facing a crisis in terms of direction, curricula, teaching methods, facilities, remuneration, and human resources.<br>• Education is heavy on theory with a lack of practical application, and the higher educational curriculum does not match the demands of the growing economy. |
| Energy | • Energy demand is projected to rise at over 10% per year in the near future which may lead to significant pressure to invest in additional power infrastructure to support the increasing demand. |
| Health | • Lack of comprehensive, multidisciplinary approach to tackle ICT Healthcare issues. Lack of IT health staff both in quantity and quality, lack of investment resources, including finance and equipment, and the capacity of international integration as well as determination in applying public health informatics. |
| Transport | • High congestion during peak hours both in public transport and on road.<br>• Lack of ring roads and highways, limited road network coverage and parking space. Poor connectivity between transport modes, lack of public mass transit, high dependence on private transport, poor transport management systems. |

## Smart Solutions

| | |
|---|---|
| Buildings & Environment | • Increasing urbanisation and industrialisation is expected to provide market growth for building-related industries. The expected increase in plants and operations set up by foreign multinational companies will provide opportunities. |
| Digital Media | • Introduction of 3G services driving high growth rate of Vietnam's smart-phone market.<br>• Vietnam has recently emerged as a more-competitive destination for producers of mobile devises/phones such as Samsung and Nokia. |
| Education | • The Government is introducing various educational reforms such as Resolution 14/2005 on Comprehensive and Fundamental Reform of Higher Education in Vietnam 2006-2020. |
| Energy | • Vietnam is endowed with a large amount of renewable energy (mini hydro, biomass and solar). The government of Vietnam and world bank are investing in renewable energy development in the country. |
| Health | • The Vietnamese Government has paid special attention to guiding IT application development and implementation. To implement this policy, the Ministry of Health has created the IT Application Steering Committee to direct this mission. |
| Transport | • Ho Chi Minh City Urban Railway project.<br>• Ho Chi Minh City Urban Expressway project. |

## Buildings & Environment
# Solid Waste Recycling and Treatment System

#100 opportunity

| | |
|---|---|
| **Key Challenge** | • Lack of funding and equipment, public awareness, technical capability for hazardous waste treatment. |
| **Programme** | • Ministry of Natural Resources and Environment (MONRE) has identified waste management as one of their top environmental priorities.<br>• Growth in hazardous-waste-intensive industries such as chemical products and electronic products is expected to increase the demand for proper handling of waste. |
| **Smart Element** | • Hazardous Waste Management Solutions and Process Capabilities, with integrated solutions. In addition, the composition of Vietnamese waste makes composting potentially attractive, where composting reduces disposal costs while producing a marketable soil conditioner for agricultural and public uses. |
| **Opportunity** | • **The waste recycling business has the potential to double in size.** |
| **Main stakeholder** | • Ministry of Natural Resources and Environment (MONRE).<br>• Official Development Assistance (ODA) - major source of financing for most of Vietnam's environmental projects in general. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to mid term | Small to medium | Low |

## Buildings & Environment
# Industrial Air Pollution Control System

#101 opportunity

| | |
|---|---|
| **Key Challenge** | • Poor enforcement of regulation hampers market demand and growth.<br>• Low-cost air pollution control systems from countries such as China challenging the market development. |
| **Programme** | • The Government has implemented fees on air pollution and introduced a Prime Ministerial Decision to reallocate, close down, or adapt cleaner technologies. The revised Law on Environmental Protection (LEP) now requires polluters to clean up and compensate those affected. |
| **Smart Element** | • Ability to provide improved efficiency of controlling air pollutants in terms of ability to capture smaller particles and reduction of pollutant emissions.<br>• Savings-oriented designs and production equipment or system. |
| **Opportunity** | • **The industrial air pollution control system market is likely to witness a boom over the next few years, owing to the commissioning of several coal-fired power plants.**<br>• **The power plants and cement industries are expected to be the key thriving industries for air pollution control systems.** |
| **Main stakeholder** | • Ministry of Natural Resources and Environment (MONRE). |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to mid term | Small to medium | Low to medium |

## Digital Media
## Smart Device Manufacturing Cluster

#102 opportunity

| | |
|---|---|
| Key Challenge | • Global software vendor Intel has selected HCMC to become one of its emerging market "smart cities" and has started several ICT initiatives realising the low rate of telecommunications service use in the country. |
| Programme | • Recognising the potential for a low-cost but educated workforce Intel has invested nearly USD 2 billion in the country, largely focusing on training engineers and teachers of which over 100,000 have been trained. |
| Smart Element | • Introducing high-quality education in the country is creating opportunities for foreign manufacturers to produce more sophisticated products when used in conjunction with HCMC's hi-tech parks and industrial estates. There is an increasing move by devise manufacturers, including smartphone manufacturers to locate here. |
| Opportunity | • **There will be particular opportunities for software and design services and other suppliers into smart devise manufacturers. The city will also be a good location for low cost value adding service operations.** |
| Main stakeholder | • HCMC Metropolitan government.<br>• Mobil Services & Network Providers such as Samsung, Nokia, Viettel, Mobifone, Vinaphone. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Large | Low |

## Education
## Education Reform

#103 opportunity

| | |
|---|---|
| Key Challenge | • Traditional method of rote learning to cope with large examinable content.<br>• Inflexible methods of teaching does not promote critical thinking, problem solving, communication skills nor creativity in students. |
| Programme | • The Government is driving management and finance reforms in the education sector to improve education quality: improvement in proficiency in medium of instruction, reduction of textbook content, adoption of IT, and investment in schools. |
| Smart Element | • Application of information technology facilitates effective learning and knowledge transfer. |
| Opportunity | • **Supplying of teaching devices and equipment.**<br>• **Development of e-Learning tools, resources and infrastructure.** |
| Main stakeholder | • Ministry of Education & Training (MOET), local departments of education and training, Universities. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Large | Low to medium |

## Education
### Teaching and Learning English

#104 opportunity

| | |
|---|---|
| **Key Challenge** | • Although English has been included in the curriculum of secondary schools and universities, students' ability to master the four basic language skills is still very low.<br>• Lack of qualified English teachers. |
| **Programme** | • Ministry of Education & Training initiated the English teaching pilot programme in primary schools starting school year 2010-2011. |
| **Smart Element** | • Improve students' four basic language skills while enhancing learning experience.<br>• Improve teachers' English qualification and pedagogical skills. |
| **Opportunity** | • **Opening of English language centres equipped with high-tech teaching devices.**<br>• **Development of interactive English-learning tools, e-learning resources.**<br>• **Training programmes for teachers.** |
| **Main stakeholder** | • Ministry of Education & Training (MOET), local education and training departments. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Low to advanced |

## Energy
### Renewable Energy Development Project

#105 opportunity

| | |
|---|---|
| **Key Challenge** | • Increasing the share of renewable energy in Vietnam's fuel mix and providing energy security to the country. |
| **Programme** | • The project approved in 2009, is a World Bank initiative to invest in renewable energy projects, assist in developing the regulatory infrastructure, and developing a pipeline of projects. |
| **Smart Element** | • Generation of electricity through renewable sources such as small hydro, biomass, solar and wind. |
| **Opportunity** | • **The pipeline of projects created would provide opportunities to multiple players such as investors, technology suppliers, EPC contractors to partner in project development.** |
| **Main stakeholder** | • World Bank.<br>• Ministry of Industry & Trade. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Medium |

## Energy
# Vietnam's National Energy Efficiency Program

#106 opportunity

| | |
|---|---|
| Key Challenge | • Rapidly increasing energy demand in the country and increasing cost of energy leading to a need to minimize the demand. |
| Programme | • The National Energy Efficiency programme was launched in 2006 and is the first comprehensive effort in the country to improve energy efficiency and conservation in all important sectors. |
| Smart Element | • Efficient use and conservation of energy. |
| Opportunity | • **Opportunity for technology suppliers in multiple fields: high energy efficiency equipment, energy efficient transport, energy efficiency in buildings, industrial energy efficiency etc.** |
| Main stakeholder | • Asian Development Bank (ADB).<br>• Ministry of Industry and Trade. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Medium |

## Health
# Electronic Health Record Management System

#107 opportunity

| | |
|---|---|
| Key Challenge | • To standardise and modernise the current health record management system in Vietnam. |
| Programme | • E-Health Capacity Building Program. |
| Smart Element | • Integration of ICT and health records through a standardised and easy to use system. |
| Opportunity | • **Electronic Health Management System, integrated network connection between hospitals country-wide and hospital statistical software.** |
| Main stakeholder | • Ministry of Health, IT Application Steering Committee. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate to mid term | High | Low to medium |

## Health
## Telemedicine – Healthcare to Remote Areas

#108 opportunity

| | |
|---|---|
| Key Challenge | • Healthcare delivery to remote areas through progressive implementation of telemedicine and mobile healthcare. |
| Programme | • Telemedicine Implementation. |
| Smart Element | • Integration of care to remote areas through telemedicine. |
| Opportunity | • **Telehealth and telemedicine.** |
| Main stakeholder | • Ministry of Health, IT Application Steering Committee. |

| Timelines | Size | Technology |
|---|---|---|
| Mid to long term | High | Medium to high |

## Transport
## Intelligent Transport Systems

#109 opportunity

| | |
|---|---|
| Key Challenge | • A large number of private vehicles, especially at peak hours, leading to traffic congestion.<br>• A high accident rate. |
| Programme | • Ho Chi Minh City Urban Expressway project. |
| Smart Element | • Reduce traffic congestion, increase access and connectivity between different transport modes. |
| Opportunity | • **Road pricing system, in-vehicle units and payment solutions, automatic toll collection system, navigation and telematics, real-time traffic information, journey time indication system, area traffic control system.** |
| Main stakeholder | • Ministry of Transport (MOT), Department of Transport of Ho Chi Minh City, Directorate for Roads of Vietnam (DRVN). |

| Timelines | Size | Technology |
|---|---|---|
| Medium to long term | Large | Medium to advanced |

# Transport
## Automatic E-Ticketing System

#110 opportunity

| | |
|---|---|
| Key Challenge | • Long waiting times, loss of fare revenue, and ticket fraud.<br>• Manual, time-consuming and inaccurate reporting system. |
| Programme | • Ho Chi Minh City Department of Transport is piloting smart ticketing for 2 routes: Route 1: Saigon – Binh Tay; and Route 27: Ben Thanh – Au Co – An Suong Bus Station. |
| Smart Element | • Cashless system would reduce transaction time and revenue leakage significantly while improving efficiency and accuracy of reporting system. |
| Opportunity | • **Electronic ticketing and automated fare collection, alternative reloading infrastructure leveraging mobile operators and banks.** |
| Main stakeholder | • Ministry of Transport (MOT), Department of Transport of Ho Chi Minh City. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Large | Low |

# Transport
## New Urban Railway Network

#111 opportunity

| | |
|---|---|
| Key Challenge | • Traffic congestion on road due to large number of private vehicles.<br>• Congestion causing long waiting times, poor services and shortages of buses during peak hours. |
| Programme | • First metro line Ben Thanh – Suoi Tien is expected to be operational by 2015, and second metro line Ben Thanh – Tham Luong by 2016.<br>• Four other metro lines are in design stage or under review. |
| Smart Element | • Efficient interchange nodes to enable seamless access and connectivity for passengers between different transport modes and routes. |
| Opportunity | • **Rail management system.**<br>• **IT infrastructure in stations and trains.**<br>• **Journey planner.** |
| Main stakeholder | • Ministry of Transport (MOT), Department of Transport of Ho Chi Minh City, Vietnam Railway Administration (VNRA). |

| Timelines | Size | Technology |
|---|---|---|
| Mid to long term | Large | Low |

# Transport
## Smart Parking System

#112 opportunity

| | |
|---|---|
| **Key Challenge** | • Lack of urban parking spaces contributing to existing issues of road blockages and traffic congestion. |
| **Programme** | • Circular 24/2010/TT-BGTVT encourages and facilitates all economic sectors in the building and upgrading of bus stations, stops and parking lots. |
| **Smart Element** | • Efficient and secure parking which in turn reduce space occupation and traffic congestion. |
| **Opportunity** | • **Smart parking infrastructure.**<br>• **Integrated parking lot management system.**<br>• **Parking lot notification system.** |
| **Main stakeholder** | • People's Committee of Ho Chi Minh City, Construction Department of Ho Chi Minh City. |

| Timelines | Size | Technology |
|---|---|---|
| Immediate | Medium | Medium to advanced |

# Current and Future Smart Integration

| | Remarks | Level |
|---|---|---|
| Macro Environment | • Fastest growing economy with annual growth rate of 11.8%. GDP per capita is USD2,800.<br>• Population reaches 7.4 million and expected to grow to 8.2 million in 5 years. | |
| Smart Opportunity | • Vietnam is still in the developing stage, and smart solutions are expected in the medium to long term.<br>• High government control and support for initiatives. | |
| Fit with Capability | • Low-cost smart technologies and solutions would fit the current context.<br>• Competition with companies from Development Assistance donor countries. | |
| Timeframe | • Some smart initiatives are in pipeline.<br>• Projects may take longer time than expected. | |
| Overall Attractiveness | • Opportunities would be high in the medium to long term.<br>• Connection with the officials will increase opportunities. | |

# Summary of Hot Spots by Theme

| Theme | Current status | Smart outlook | Timeframe |
|---|---|---|---|
| Buildings & Environment | There are existing foreign players but market awareness remains low due to lack of enforcement. | The enforcement of regulations would drive market growth for both waste management and air pollution control. | Mid term |
| Digital Media | Mobile Penetration > 90%, household broadband penetration >20%. | 4G services should be commercialized in 2014. | Medium term |
| Education | Low adoption of information technology, traditional methods of teaching and learning. | Application of information technology to teaching and learning process. | Immediate to long term |
| Energy | Needs improvements from both generation and efficient use of energy. | Renewable energy and energy efficiency development plans would have a significant impact. | Immediate |
| Health | Established a national policy to modernize current healthcare delivery through ICT applications. | Nationwide healthcare delivery through standardisation of health records and ICT apps. | Immediate to long term |
| Transport | High dependency on private transport and lack and low quality of public transport. | Intelligent transport systems and development of public transport will ease traffic congestion. | Immediate to long term |

# Smart City Projects in Other Cities in Vietnam

## Da Nang City

### Project Overview

- Da Nang City aims to be "smart city", "hi-tech city" and "sustainable city".

### Location

- Da Nang City, with a population of 795,670 people, is the economic and business hub of the central region of Vietnam.

### Main Stakeholder

- Da Nang City, Cisco, Intel, IBM, FPT.

### Opportunity

- Provide advanced technologies, services and systems in terms of energy management, water management, flood management, healthcare, building, education, and transport.

### Smart City

- IBM helps Da Nang to build transport management system, clean water management and alert system, and solutions to trace food origins and provide warnings on those from disease-affected areas.

### Hi-Tech City

- Cisco helps the city to upgrade its core network to the next-generation ICT platform.
- Intel to pilot the use of most advanced technology, building foundation for e-government infrastructure.

### Sustainable City

- Designing a water management system to tackle floods and tides, which in turn, reduces disaster risks.

# Appendices and Abbreviations

## Abbreviations

| | |
|---|---|
| ADB | Asian Development Bank |
| APAC | Asia Pacific |
| B2C | Business To Consumer |
| CapEx | Capital Expenditure |
| EMS | Electronics Manufacturing Service |
| EPR | Electronic Patient Record |
| FDI | Foreign Direct Investment |
| GDP | Gross Domestic Product |
| HCMC | Ho Chi Minh City |
| ICT | Information and Communication Technology |
| IMF | International Monetary Fund |
| LTE | Long Term Evolutions |
| T&D | Transmission & Distribution |
| UK | United Kingdom |
| US | United States |
| USD | United States Dollars |

To find out more, scan this code with your smart phone.
**www.ukti.gov.uk**
**+44(0)20 7215 8000**

Solutions for Business
Funded by UK Government

UK Trade & Investment is the Government Department that helps UK-based companies succeed in the global economy. We also help overseas companies bring their high-quality investment to the UK's dynamic economy acknowledged as Europe's best place from which to succeed in global business.

UK Trade & Investment offers expertise and contacts through its extensive network of specialists in the UK, and in British embassies and other diplomatic offices around the world. We provide companies with the tools they require to be competitive on the world stage.

UK Trade & Investment is responsible for the delivery of the Solutions for Business product "Helping Your Business Grow Internationally." These "solutions" are available to qualifying businesses, and cover everything from investment and grants through to specialist advice, collaborations and partnerships.

TPO NETWORK
AWARD WINNER 2010

2010 winner Best Trade Promotion Organisation in the developed world.

Whereas every effort has been made to ensure that the information given in this document is accurate, neither UK Trade & Investment nor its parent Departments (the Department for Business, Innovation & Skills (BIS), and the Foreign & Commonwealth Office), accept liability for any errors, omissions or misleading statements, and no warranty is given or responsibility accepted as to the standing of any individual, firm, company or other organisation mentioned.

Published February 2012
by UK Trade & Investment
© Crown Copyright
URN 12/565