IBM's Smarter Cities Challenge

City of Greater Geraldton

Report

Contents

1. Executive summary

Introduction

The City of Greater Geraldton in Western Australia is one of 33 cities selected to receive a Smarter Cities® Challenge grant from IBM in 2012 as part of IBM's citizenship efforts to build a Smarter Planet™ to become more instrumented, interconnected and intelligent. Over a three-year period, the IBM Smarter Cities Challenge will partner with 100 cities around the globe to solve complex urban challenges, awarding US$50 million worth of services and technology.

The challenge

During three weeks in August 2012, a team of six IBM experts worked in the City of Greater Geraldton to prepare and deliver recommendations on two key challenges identified by the City:

- Identify smart digital services and opportunities that leverage the increasing availability of broadband.
- Develop smart energy strategies that will enable the community's vision of becoming a carbon-neutral region by 2029.

Observations

With more than AUD$27 billion in development projects on the horizon, the City of Greater Geraldton is anticipated to grow from a city of 40,000 to a regional hub for Western Australia's Mid West region. The IBM team identified several factors that will influence the City's direction:

- Some residents want to preserve the existing way of life, while others are eager to accelerate growth and establish a global presence.
- Citizen engagement is a prominent element in the community, but varies widely. Young people, in particular, want to be more engaged in developing Greater Geraldton's vision, which could help retain future talent to support growth.
- There is inconsistent broadband accessibility, variation in access speed and reliability issues with the current Internet service.

- Economic development studies indicate that the City could face energy capacity constraints as early as 2014.
- Greater Geraldton's proximity to mining sites and ports, combined with its moderate climate and abundance of solar, wind, wave, geothermal and biomass energy, creates significant opportunity for economic development.

Recommendations

The IBM Smarter Cities Challenge team offers recommendations organised into five areas.

Recommendation 1: Create the foundation for a "digital Geraldton".

Accelerate the City's ability to participate in a digital economy by building a free, public Wi-Fi network to deliver fast Internet and local content in the Central Business District, coupled with a "kick-start" programme to drive community engagement and introduce new digital services for businesses, tourists and energy projects. Also, resolve some of the network bottlenecks causing the slow Internet service today by aggregating demand through a bulk capacity investment – a "Geraldton Internet Exchange" – that also would help spur local content creation and distribution.

Recommendation 2: Create smart digital services and community hubs.

- **"MyGeraldton" digital services:** Create a one-stop shop for mobile and web experience that is a portal to City government and community services. It will also help the City engage directly with citizens on issues, collect ideas and understand current sentiments. The portal could also house an "open data" initiative, where City and other data would be available to the citizens and businesses. For example, the IBM team recommends creating a "smart energy hub" that would serve as a central data-collection point to monitor electric and water usage, as well as waste management, to help drive changes in energy consumption patterns so Geraldton remains an affordable location in the Mid West.

- **Startup hub:** Create a business incubator for entrepreneurs in the Central Business District, with fast Internet, logistics and marketing support, possibly run by a startup as a not-for-profit organisation, in partnership with local agencies to drive a diverse mix of industries.
- **Digital youth hubs:** Create age-appropriate, physical spaces in the community for youths to congregate, while providing mentoring and technology access opportunities to encourage the right digital culture, build skills and nurture global perspectives.

Recommendation 3: Develop innovative opportunities.

- **Workforce of the future:** Share digital resources among local high school, trade and university facilities for custom digital learning and collaboration to create advanced skills that attract researchers and employers to the region.
- **Digital tourism:** Create citizen-sourced social media content to promote Greater Geraldton and syndicate content globally through "smart tourism applications".

Recommendation 4: Develop smart energy solutions.

- **Virtual power plant:** Create a distributed network of small-scale generation and storage sources (such as solar panels and fuel cells) to create a "virtual power plant". Use the data aggregated from these generation and storage devices, in conjunction with residential and business smart meters, to manage peak consumption and balance the load on the electrical grid. This approach would assist in moderating the growing cost of energy for consumers and enable utility providers to redirect capital investment towards economic growth.
- **Renewable energy initiative:** Implement a strategy to facilitate creation of large-scale, renewable-energy projects in the Mid West to replace carbon-intensive power plants. This would support the anticipated energy demands of the mining industry, provide investors with carbon tax credits and create a competitive edge in attracting new mining projects while supporting the vision of becoming a carbon-neutral region.

Recommendation 5: Create a Leadership Alliance.

Create a cross-community Leadership Alliance that meets regularly to share information, develop a common vision for Greater Geraldton, set specific priorities, conduct regular assessments of initiatives, track progress and ensure that citizens are engaged in the change process.

Conclusion

Greater Geraldton has developed an exciting vision for its long-term growth and has the economic opportunities to make this vision a reality. The community has the potential to become a model for cities that want to leverage technology to support sustainable, rapid growth, as well as those that want to leverage natural, renewable energy sources to become carbon neutral.

- Small city with abundant renewable energy sources and economic opportunities
- Innovative short-term initiatives, using digital resources to enhance way of life
- City rich in natural beauty that can leverage digital technology to boost tourism
- Open to innovative strategies to support the vision of a carbon-neutral region

2. The challenge

A. The Smarter Cities Challenge

In 2010, IBM Corporate Citizenship launched the Smarter Cities Challenge to help 100 cities around the world over a three-year period become smarter through grants of IBM talent. Greater Geraldton was selected through a competitive process as one of 33 cities to be awarded a Smarter Cities Challenge grant in 2012. Since the programme's inception in 2010, to date, 64 cities have received Smarter Cities Challenge grants, and many of these have already made great progress on the road to becoming more instrumented, interconnected and intelligent (additional information available at www.smartercitieschallenge.org).

During a three-week period in August 2012, a team of six IBM experts worked in the City of Greater Geraldton to deliver recommendations around specific issues identified by the City and key community stakeholders.

B. The challenge

The City of Greater Geraldton was established in July 2011 as an amalgamation of the City of Geraldton-Greenough and the Shire of Mullewa. Located in the Mid West region of the state of Western Australia, which occupies the western third of the country, the City is a regional capital with rich economic opportunities. In fact, the Mid West Development Commission reports more than AUD$27 billion in projects planned or proposed in the Mid West region during the next 5-7 years. As a result, the community is projected to grow rapidly.

In addition, Geraldton is one of the early release sites for the National Broadband Network (NBN) and also the Point of Interconnect for NBN for all of the Mid West and northern Western Australia, making it a digital gateway for the region. In recent years, the City and other key stakeholders have developed strategic plans and visions of the community's future, including a commitment to being a carbon-neutral region by 2029.

City leaders asked the IBM Smarter Cities Challenge team to address two challenges:
- Identify smart digital strategies and opportunities that leverage the increasing availability of broadband.
- Develop smart energy strategies that will enable the community to meet its vision of becoming a carbon-neutral region, while meeting its growing energy demands, for continued economic growth.

During the course of the stakeholder interviews, the team identified a third challenge – the need to develop a groundswell of community commitment to drive results, which community leaders agreed should be added to the project's scope.

C. Approach

The IBM team used a multi-pronged approach to gain the insight required to make meaningful recommendations:

- **A kick-off meeting:** Meetings with the City's chief executive officer and his key staff to understand their goals and priorities for the City and expectations of the project
- **Interviews:** Conversations with more than 100 people over two weeks – including City officials, business leaders, utility executives, scientists, farmers, educators, entrepreneurs, non-profits, students and citizen trustees – to understand their insights regarding the use of technology and the energy challenges facing the community
- **Site visits:** The IBM team visited Geraldton's seaport and airport, as well as schools, businesses, construction sites and local tourist attractions. It also visited one of the outlying communities, Mullewa, which is 100 kilometres from the city centre, but is part of the City of Greater Geraldton. A cultural tour by the local Aboriginal Yamaji hosts provided an understanding of their perspective. The team also attended community meetings to better understand how they experience the digital world.

- **Analysis of supporting materials:** Reviewed studies, reports and plans provided by the City and interview participants, then synthesised interview notes across the team and identified common themes used to develop the recommendations
- **Research to generate ideas and validate hypotheses:** Looked for best practices and innovations developed by other cities and states facing similar challenges, as well as academic research, and then validated the feasibility of the recommendations from cost, resource and acceptance perspectives.

3. Context for recommendations

A. Background

The City of Greater Geraldton is a regional capital with plentiful economic opportunities. It is a port community, 424 kilometres north of Perth, with a population of about 40,250. It is the largest city in the 4,040-kilometre stretch between Perth and Darwin. Its diverse economy is based on the port and a breadth of strong industries, including fishing, agriculture, mining, scientific development, tourism, telecommunications, education and renewable energy. Several studies estimate that the population could double in coming years, depending on the progress of various construction and mining projects currently in the planning stage.

According to the Western Australia Mid West Development Commission, Greater Geraldton is surrounded by growth opportunities. More than 100 projects, with a combined construction value of AUD$27 billion, are under way, planned or proposed within the next seven years, largely driven by mining and energy development (see Table 1). The City and surrounding region have undertaken a number of strategic planning initiatives, and have been recognised by the United Nations for its community participation and engagement in defining a common vision through its "2029 and Beyond" initiative.

In recent years, the City's boundaries have expanded to incorporate several surrounding communities. The Greater Geraldton local government district covers 12,483 square kilometres, providing services to both urban and rural populations.

Furthermore, Greater Geraldton is the location of the NBN Point of Interconnect (POI) for the entire Mid West and North regions of Western Australia, an area spanning more than 1.5 million square kilometres and covering a population of more than 150,000 residents. This provides opportunities for the City to lead the region's development of a digital economic base.

From an energy perspective, the City of Greater Geraldton has committed to becoming a carbon-neutral region by 2029 – a particular challenge considering that it is projected to face an energy shortage as early as 2014. Additional energy capacity will be necessary to meet the projected growth of the region.

Table 1: Selected development opportunities surrounding the City of Greater Geraldton

Project	Investment *(AUD$ in millions)*
Asia Iron Holdings – Extension Hill magnetite project (iron ore)	3,000
Crossland Resources – Jack Hills Expansion project (iron ore)	3,900
Karara Mining Ltd. – iron ore project	2,570
Oakajee deep water port	2,000
Karara Mining Ltd. – Geraldton port facilities	250
Brookfield Rail – Mid West rail upgrade	500
Investec – Chapman solar farm	200
Verve Energy and Macquarie Capital Group – Mumbida wind farm	250
SKA Organisation – Square Kilometre Array radio telescope	2,500

Source: Mid West Development Commission, Mid West Major Projects Summary (December 2011)

B. Findings

While the City is a potential economic hot spot, the IBM team identified barriers that could impede the realisation of that potential. There exists a need to balance preserving the existing way of life with aspirations to accelerate growth and establish a global presence. Existing community-based, collaborative engagement efforts, which have been recognised by the United Nations as exemplary, offer a constructive venue for these conversations.

Digital challenges and opportunities

Greater Geraldton aspires to be a leader in the digital economy; however, Internet access speeds are slow and lack reliability across neighbourhoods. Reliable, affordable and ubiquitous access to information, businesses and citizens will be needed to fully realise new opportunities, economic growth, education and improved services.

As Internet access improves, the City should expect abundant opportunities for local merchants to engage in ecommerce, educational institutions to connect with students, government agencies to offer digital services for citizens and healthcare providers to connect with patients. Additionally, the City will be able to engage youths through technology to learn and teach, meeting the desire of youths to be engaged in the broader community and be part of the vision for Greater Geraldton's future. There are opportunities for youths to mentor the adult population and for technology entrepreneurs to mentor youths – something both local entrepreneurs and students expressed eagerness to act upon.

Challenges and opportunities to becoming a carbon-neutral region

Greater Geraldton aspires to be a carbon-neutral region. Its geographic location gives the City access to five forms of renewable energy: solar, wind, wave, geothermal and biomass. It is already a leader in the use of renewable energy – about 30 percent of the City's electricity is derived from wind and solar power, and more investments are being planned.

Ironically, rapid regional growth could result in Greater Geraldton facing an energy shortage during the next few years. The goal of keeping energy affordable creates some urgency for the community to act on a plan to reduce energy demands during peak periods. Doing so would postpone energy shortfalls until already-planned new energy sources become available. Learning to balance energy demands and meeting the community's vision of a carbon-neutral future will require a new way of managing energy consumption by putting control in the hands of the citizens to monitor their own energy usage. During interviews, a group of citizens expressed a keen interest in learning how to manage and reduce energy costs.

Delivering results in the community

The City and region have invested significantly during the past three years in developing City, regional, economic, social, digital and energy plans. There appears to be an abundance of opportunities, with many well-developed strategic plans. As one report noted, "At this point, delivery is key as there is little further benefit to be gained from additional reports and studies." Interviewed citizens conveyed knowledge of the plans and are anxious to see results, most often mentioning the recent development of the city's foreshore area as the most visible result of planned development. There is a desire to build upon that development to attract visitors and future residents, as well as to make the city more liveable for the current population.

C. Recommendations

The IBM Smarter Cities Challenge team's recommendations are organised into five areas, incorporating the work of existing community initiatives when appropriate.

Recommendation 1: Create the foundation for a "digital Geraldton"

The promise of greater Internet speed and connectivity offered by the NBN is progressively being rolled out across the country. However, there are two steps that can be taken now to accelerate the ability of the community to more fully engage in a digital economy.

1.1   Build a free, public Wi-Fi network

The City should extend its existing, but limited, free, public Wi-Fi network covering a small portion of the Central Business District (CBD) to include all of the CBD and other key neighbourhood centres, including Mullewa. This should be coupled with a "kick-start" programme that provides services to digitally-enable local businesses willing to be early adopters to accelerate usage of this new network and demonstrate tangible value to the community. This would be a "quick win" to stimulate the creation of digital services and content to support, promote and extend the use of technology by local businesses.

1.2   Establish a Geraldton Internet Exchange

Based on widespread community feedback, as well as the IBM team's own experience, it seems there are network bottlenecks resulting in slow Internet access for both citizens and businesses. One solution could be to build a node of the Western Australia Internet Exchange in Geraldton, establishing a "Geraldton Internet Exchange" (GIX), which will complement the NBN. It would aggregate Internet demand with the bulk purchase of backhaul capacity between Greater Geraldton and Perth, using the new backbone infrastructure installed in March 2011 under the Regional Backbone Blackspots Program. In addition, the GIX also would spur local content creation and distribution, dramatically increasing the network speeds experienced by end users when local content is locally consumed. Before any significant investment in infrastructure is made, however, a technical assessment and solution workshop should be conducted to validate this approach.

Recommendation 2: Create smart digital services and community hubs

Greater Geraldton is the Point of Interconnect for the NBN for the Mid West and North regions of Western Australia. It will also be among the first communities to receive all three forms of connectivity: fibre, fixed wireless and satellite. The IBM team recommends four initiatives to take advantage of this and engage the community through digital services to improve the quality of life in the community.

2.1   "MyGeraldton" digital services

The City should create a mobile-enhanced web portal for citizens to access City government services and information that would better connect them with the City to improve their way of life. The City of Greater Geraldton can engage directly with citizens on issues, collect ideas and understand the sentiment of the community. The portal can also be a foundation for an "open data" initiative which, over the longer term, could allow government and businesses to be able to consolidate data and analyse it to predict trends and better tailor services. The City already has a grant to make some services digital, and the team recommends the creation of citizen accounts with the City to ensure privacy and security when using City services.

2.2   Smart energy hub

As a component of the MyGeraldton portal, the smart energy hub should focus initially on providing integrated and intelligent technologies for the management of energy, water and waste. The hub also should support and promote energy and resource efficiencies, as well as re-use opportunities. It would aggregate data, generate actionable insights through analytics and create learning systems to allow consumers to manage their energy consumption, helping reduce peak power demand.

The hub would enable citizens to connect with utility providers and the City, empowering users to educate themselves on how to best reduce peak energy demands and manage water consumption. This would allow the City of Greater Geraldton to become more energy efficient, affordable and sustainable. The data set would include data beyond that which the City currently collects.

2.3 Startup hub

The City should establish a startup hub as a physical, multi-tenant space that is a digitally-enabled business incubator supporting local entrepreneurs and small business startups. It should be equipped with high-speed Internet, video-conferencing rooms, "smart mailboxes", hot-desks and space for "pop-up stores". This hub would be a convening space for mentoring and sharing ideas to incubate new business ventures. It should be linked to planned or existing community programmes, such as the Digital Enterprise initiative.

2.4 Digital youth hubs

The City should establish age-appropriate physical spaces for youths that are safe and multi-purpose with free and fast wireless connections, with the physical spaces designed in consultation with youths as a place to congregate, collaborate and create. They should include high-performance networks for gaming and promote education on the appropriate uses of social media, such as privacy, security and civility. They should be run by youths under adult supervision and have the support of local schools to help youths build global connections, develop global perspectives, and, importantly, nurture the right digital culture.

Recommendation 3: Develop innovative opportunities

While smart hubs engage the community, there are two short-term opportunities that can demonstrate what could be done as the next evolutionary step to innovate for the future.

3.1 Workforce of the future

High school, trade and university education providers in Greater Geraldton, along with local healthcare and research providers, should undertake a joint initiative to leverage the opportunities of increased digital access. This could be jump-started by the "education and health precinct", with key members being part of the Geraldton Internet Exchange described in Recommendation 1 or other potential fast Internet speed alternatives. Advanced e-learning technologies and facilities could open pathways for local students, grow labour skills, help retain youths and create a vibrant, diverse economy. Local universities have begun digital initiatives however, by working together with local secondary schools. They could undertake opportunities that would make a difference to the community and local economy.

3.2 Digitally-enabled tourism

The City's Visitors Centre should leverage smart digital services to promote and enhance the Greater Geraldton tourist experience. This should be done in conjunction with the proposed startup and digital youth hubs from Recommendation 2 and the existing CivicEvolution initiative under the City's "2029 and Beyond" initiative. Options include:

- Students could be given high-definition cameras to film local activities to generate content for a dedicated YouTube channel highlighting Greater Geraldton.
- The Visitors Centre could work with the Aboriginal Yamaji community, with the approval of the elders, to create a YouTube "DreamTime" channel to share the Yamaji culture and stories.
- Yamaji art and crafts could be promoted through e-commerce initiatives, in partnership with entrepreneurs from the startup hub, to local and international visitors.
- Independent tour operators for the Abrolhos Islands, indigenous history, snorkelling, diving, surfing and Mullewa wildflowers could be showcased, as well as rich eco-tourism opportunities, including local wind farms and biodiversity sites.

Recommendation 4: Act upon opportunities to become the renewable-energy capital of Australia

Given Greater Geraldton's potential near-term energy shortage and its abundance of renewable energy sources, the IBM team offers two recommendations (one near- to mid-term and one long-term):

4.1 Virtual power plant

The Greater Geraldton community should create a distributed network of small-scale generation and storage sources (such as solar panels and fuel cells) to create a "virtual power plant". By aggregating data and information from all the small-scale energy devices, the community would be able to develop a network of these various energy sources that can be combined with load management and energy storage systems to improve the quality and reliability of the electricity supply.

Active energy management, through the proposed integrated operations centre, will enable the City to gain a clear overview of the true small-scale generation activities. This could assist in postponing or bridging the projected energy shortages by creating a "virtual power plant" that supports the reduction of peak demands on the existing electrical network.

4.2 Renewable energy initiative

Greater Geraldton and the surrounding region should investigate creating a visionary, large-scale, renewable array in the Mid West region that uses the available renewable energy. This would include investigating renewable energy sources that can reliably supply mining sites, as well as the correct mix to support base and peak energy loads.

There is a similar project currently being developed in North Africa for Europe. If this effort were undertaken in the Mid West region, it could be a new source of energy to support demands of the mining industry and reduce the carbon tax impost. It also would provide a competitive edge in attracting new mining projects to the region.

Recommendation 5: Launch a Leadership Alliance to drive results

All of the recommendations in this report will require a governing body of stakeholders to turn plans into reality. The IBM team recommends the creation of a Leadership Alliance that meets regularly – initially every two weeks – to develop a common vision, share information, set priorities, conduct regular assessments of progress and solve challenges.

The Leadership Alliance could be sponsored by the existing Greater Geraldton Economic Alliance. The eight members should include five local deputies of the state-level principals in the Greater Geraldton Economic Alliance and three local industry and community members. One of the local industry or community members should be designated as an independent chair. Targeted working groups should be engaged on specific priorities as appropriate. Organisers could draw upon similar models being used in the Pilbara and Townsville.

D. Roadmap for action

To provide a sense of priorities and timing for implementing these recommendations, Figure1 provides a roadmap depicting the possible interdependencies and sequence, as well as expected key deliverables and milestones.

The roadmap is segmented into three phases:
- **Horizon 1:** Quick wins and strategic planning – covers the remainder of the City's fiscal year 2012/2013, from the time of the project's kick-off
- **Horizon 2:** Delivering on the vision – covers the City's fiscal year 2013/2014, when key milestones should be achieved and some operational aspects of the project begin
- **Horizon 3:** Augmenting the vision – covers the City's fiscal year 2014/2015 and beyond, when activities are regularly reviewed and assessed
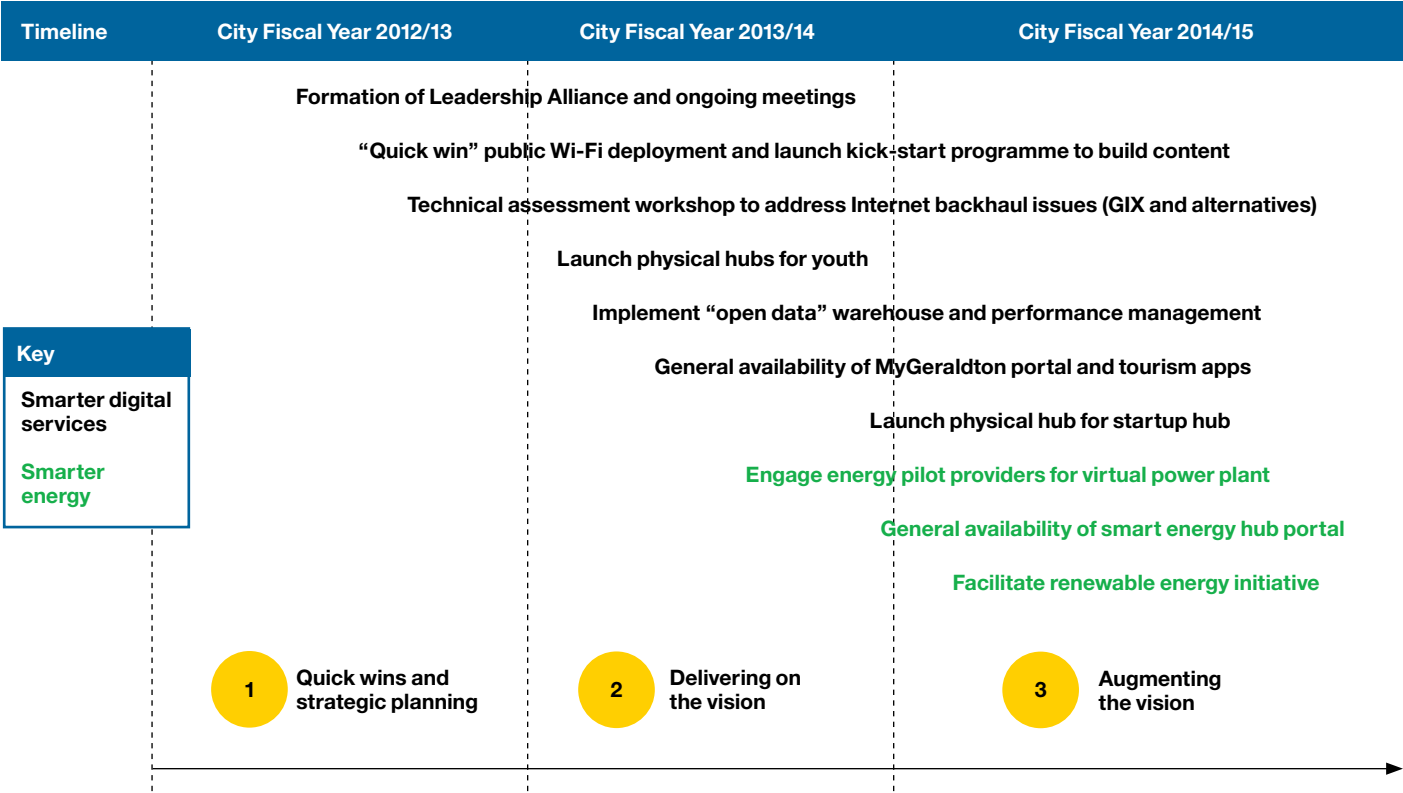
Timeline	City Fiscal Year 2012/13	City Fiscal Year 2013/14	City Fiscal Year 2014/15

Formation of Leadership Alliance and ongoing meetings

"Quick win" public Wi-Fi deployment and launch kick-start programme to build content

Technical assessment workshop to address Internet backhaul issues (GIX and alternatives)

Launch physical hubs for youth

Implement "open data" warehouse and performance management

General availability of MyGeraldton portal and tourism apps

Launch physical hub for startup hub

Engage energy pilot providers for virtual power plant

General availability of smart energy hub portal

Facilitate renewable energy initiative

Key

Smarter digital
services

Smarter
energy

① **Quick wins and strategic planning**

② **Delivering on the vision**

③ **Augmenting the vision**

Figure 1
Example roadmap of recommendation implementation

12

4. Recommendations

Recommendation 1.1: Build a free, public Wi-Fi network

The City should extend its existing, but limited, free, public Wi-Fi network covering a small portion of the City's Central Business District (CBD) to include all of the CBD and other key neighbourhoods, including Mullewa. Importantly, this initiative should be coupled with a "kick-start" programme to accelerate usage of the network and demonstrate tangible value to the community. The Wi-Fi network should also be linked to the Geraldton Internet Exchange (see next recommendation) to support local content creation and development.

Scope and expected outcomes

Deploy a consumer-grade, Wi-Fi Internet access network that would cover the main citizen activity centres at the Greater Geraldton foreshore area and surrounding retail and commercial zones. The new closed-circuit television optical fibres should be investigated for viability as the base network infrastructure.

This project would require:
1. Implementation of Wi-Fi infrastructure, high-speed links to the Internet, and interactive digital displays around city locations and key neighbourhood centres, including Mullewa
2. Linkage to the Geraldton Internet Exchange to support local content creation and development
3. Linkage to the development of a mobile device application and the "MyGeraldton" website, which would be tightly integrated with social media, augmented reality and location-aware services to promote local businesses and community activities in the Wi-Fi coverage area (see Recommendation 2.1)
4. Establishment of success metrics and baseline prior to commissioning Wi-Fi infrastructure, then tracking results over a meaningful period (quarterly for two years) and communicating them to the community to demonstrate value and drive usage growth
5. Establishment of a targeted "kick-start" programme to bring local businesses and community groups online rapidly by providing them with digital services (developing applications and websites) to accelerate their uptake; provide incentives for early adopters (such as matching grants up to AUD$5,000 for the first 20 businesses to "go digital"). This "kick-start" programme could be linked to the startup and digital youth hubs in Recommendation 2 as a way of developing applications and websites

Expected benefits include:
- Measurable and demonstrable increase in city vibrancy
- Growth in number of new, local "digital" businesses
- Increased business for existing local businesses

Key dependencies and critical success factors include:
- Successful "kick-start" programme to bring local businesses online rapidly and build an early volume of content that would complement the existing Digital Enterprise Grants the City recently received.
- Development of a sustainable business model to keep the Wi-Fi network free for end users, such as through advertising and sponsorship from local businesses.

Recommendation 1.1: Build a free, public Wi-Fi network

Proposed owner and stakeholders	Suggested resources needed
Owner: City Council **Stakeholders:** Midwest Small Business Centre for "kick-start" programme A local technology service provider to operate the network	• Wireless-mesh network design and implementation services • Network management services • On-going telecommunications costs • Business results monitoring and community communications for two years • Business-owner engagement resources ("kick-start" programme), which would be an on-going function over a period of time (such as one year) to build enough momentum and content to be self-sustainable
Dependencies	**Key milestones, activities and timeframe**
A sufficient volume of content generated by the local businesses and community groups from an effective "kick-start" programme investment and action plan A suitable business model to enable operational costs to become self-funded over time as content and number of users make it financially sustainable	• Infrastructure and telecommunications (six months) • Creation of "kick-start" programme (12 months)
Priority status	
High	

Recommendation 1.2: Build a Geraldton Internet Exchange

The City should facilitate the establishment of a regional node of the Western Australia Internet Exchange in Geraldton, thus forming a "Geraldton Internet Exchange" (GIX) en-route to the Greater Geraldton Point of Interconnect within the "education and health precinct", following a technical assessment and solution workshop conducted to validate the approach.

Scope and expected outcomes

Stage 1: Technical assessment and solution workshop
- Conduct an assessment of Internet speeds with community representatives, spanning demographics, Internet access types and plans, Internet application types, usage patterns, times of use and geographic location – benchmarked to a recognised or agreed standard or metric, such as those currently used in Perth.
- Conduct a validation workshop to evaluate the GIX solution against other alternatives that provides the desired outcome. A positive result would be required to move to Stage 2.

Stage 2: GIX implementation
- Build an Internet data centre, purchase significantly more Internet backhaul capacity between Perth and Greater Geraldton, and offer this to local Internet service providers (ISPs).

Key outcomes expected from establishment of the GIX:
- It will deliver fast Internet speed benefits from the NBN to local citizens, stimulating early usage and value creation, ultimately accelerating economic development and growth of the region.
- This, in turn, will stimulate the creation of local content (spanning the Geraldton Point of Interconnect coverage area), helping to build skills and employment to support a digital economy.
- Connecting with AARNet would bring e-learning opportunities by tapping into the high-speed, national universities and research network.

Without addressing the network bottleneck issues, the only users who would benefit from the NBN rollout would be those with poor copper wire quality, local exchange capacity or distance issues. Others would experience little improvement in service untill all segments of the network were appropriately increased. Figure 2 illustrates the network segment that the NBN will improve and other parts of the network that the ISPs will need to address.

It is important to note that a major impediment has already been removed through the Australian government's investment in high-capacity, backbone fibre infrastructure between Greater Geraldton and Perth under the Regional Backbone Blackspots Program (RBBP), completed in March 2011. ISPs must subscribe to added capacity from this new link (or the old backbone link) and incorporate it into their service offerings in order for end users to realise the full benefit of the improved network.

Figure 3 shows a concept for a possible GIX implementation solution:

Complementing the NBN Geraldton Point of Interconnect, the GIX would serve as a key gateway infrastructure for the Geraldton community and businesses, as well as the Mid-West and North regions of Western Australia – helping create a regional digital market serving between 50,000 and 100,000 premises.

Locating the GIX in the education and health precinct, such as at the Durack Institute's campus, would allow e-health and e-learning initiatives to be early beneficiaries of this investment. As a future possibility, the GIX could become a connection node for an international submarine cable brought to Greater Geraldton from overseas, opening up significant digital-economy opportunities for the City. For example, Greater Geraldton could house a disaster-recovery solution for data centre operators in Perth or backup solutions for remote operations centres servicing the state.

When establishing the facility, the City should consider leveraging Greater Geraldton's abundant renewable energy sources to build Australia's first "carbon-neutral data centre".

Key dependencies include:
- The City must secure suitable, cost-effective real estate for construction of the data centre.
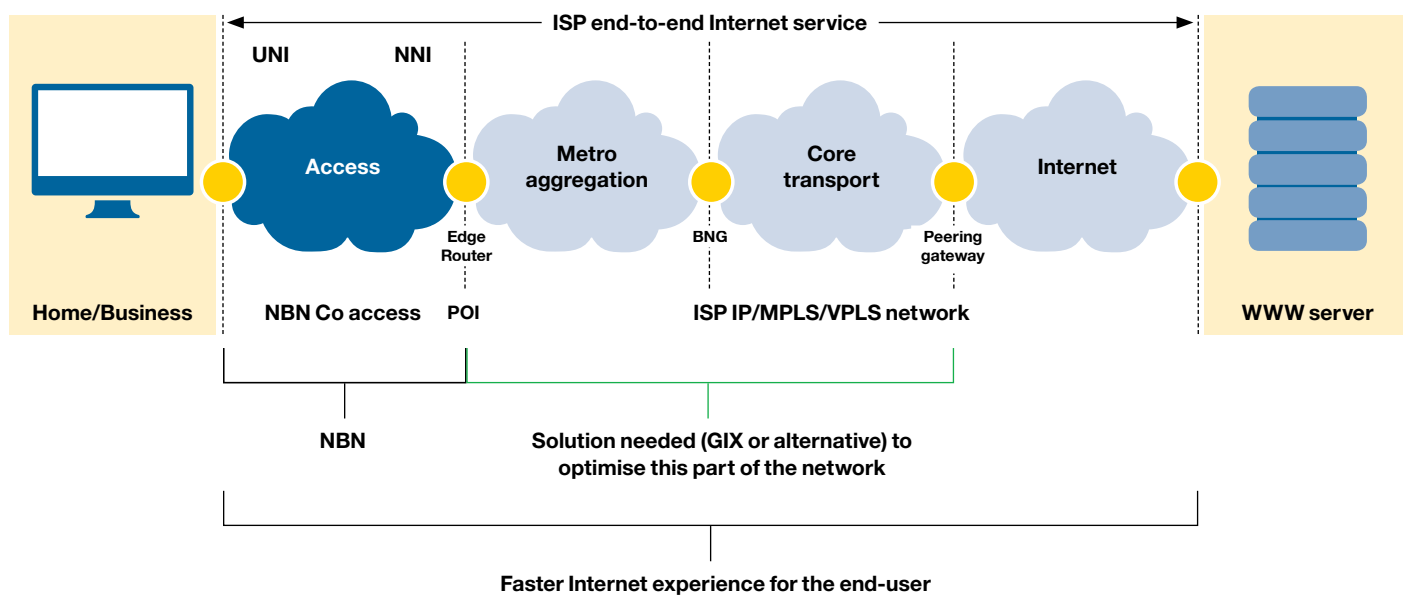- ISPs must connect to the Internet through the GIX and pass savings along to their customers.

Figure 2
Schematic of Internet access for end users
Source: http://www.nbnco.com.au/getting-connected/service-providers/product-components.html
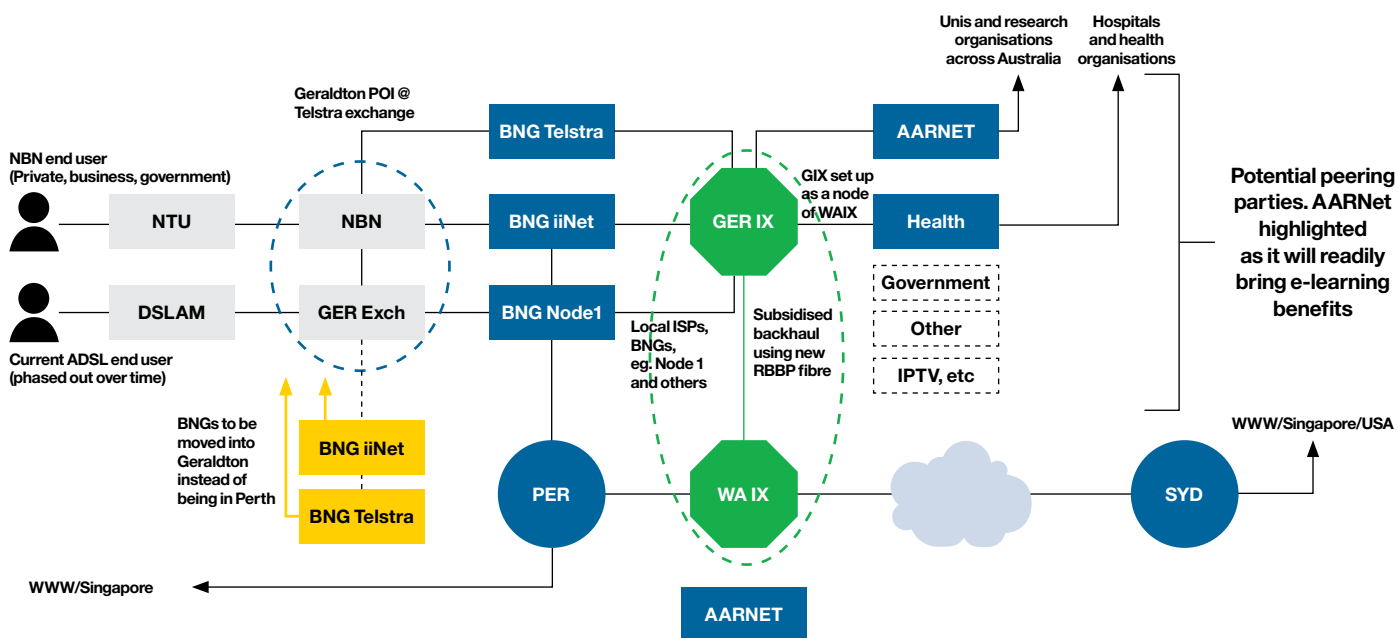

Figure 3
Depiction of the proposed GIX in context of the Western Australia Internet Exchange

Recommendation 1.2: Build a Geraldton Internet Exchange (continued)

Proposed owner and stakeholders	Suggested resources needed
Owner: Initially, this recommendation would be facilitated by the City Council. In the long term, an independent consortium should take the lead. Stakeholders: • Durack Institute • Geraldton University Centre • Midwest Economic Development Commission • Greater Geraldton City Council • Nextgen Networks, Co. • Local ISPs • Western Australia Internet Exchange • AARNet • iiNet • Telstra • Local ISPs, such as Node1	• Capital funding to building the GIX • Operational funding to run the facility for the first five years (going forward the GIX should become self-sustaining) • A collaborative arrangement among local ISPs

Dependencies	Key milestones, activities and timeframe
The City needs to complete a technical assessment and validate the need for a GIX approach via a solution workshop in six months. The City must be able to obtain suitable data centre space, such as at the Durack Institute suitable for housing the GIX facility (approximately 100 square metres) in the six months after agreement to move forward with a GIX as the solution. Local ISPs must connect to the Internet via the GIX and agree to form an independent consortium and eventually cover the cost of operating it.	• Funding secured • Design for the GIX • Backhaul link established and available • GIX construction completed • Local ISPs connected

Priority status

High

Recommendation 2.1: Create "MyGeraldton" digital services

The City should create a one-stop, mobile-enhanced online portal for accessing its information and services to better connect with citizens and improve their way of life.

Scope and expected outcomes

The portal should deliver City public information and services, also made available through a mobile application. At a later stage, the portal should be extended to incorporate non-City information and services (such as state, federal and utilities).

Greater Geraldton has already received a digital government grant to begin moving in this direction. Extending current plans to achieve more interactivity and robustness will help the City be seen as a leading digital community.

City services
The City should initially focus on developing applications for City services. A recent survey of citizens showed high usage of smartphones and notepads, but services also must be available through a website for users without mobile technology. This would reduce the number of incoming calls and workload at the City's call centre and front desk.

Transparent approval processes
The City should use process-flow technology to document various approval processes, such as inspections, permits, applications and licensing, and make the information and statuses available on the MyGeraldton portal. This will enable the community to clearly understand these processes, approval chain and status of approvals in progress. Digital forms with electronic signatures can be used by business "power users".

Citizen feedback
As a subset of the MyGeraldton portal, the City can engage directly with citizens on issues, collect ideas and understand the sentiment of the community at large. For example, the Singapore government engaged its citizens to co-design and co-deliver citizen services when it developed its "Collaborative Government" e-government strategy for 2011-2015.

City information
Given Greater Geraldton's existing commitment to engaging citizens via a deliberative democracy process, it should adopt an "open data" policy to provide the City's administrative data to the public at large through a publicly available data warehouse. Many cities around the world are doing this, with many large and small North American local governments taking the lead, such as Washington, D.C.(http://data.octo.dc.gov) and Edmonton, Canada (https://data.edmonton.ca). This would ensure comprehensive community involvement in and openness to robust discussion for the greater community good.

The non-profit InfoGov Community's Data Governance Council Maturity Model – used as a basis of self-benchmarking across organisations (www.infogovcommunity.com) – could be used for determining the information governance maturity of the City's existing data and the desired end state.

Privacy and security were key issues raised during many discussions with community members. Solid community involvement in developing an open data policy is essential to ensure acceptance, which could be achieved through a deliberative democracy approach. For example, citizens could opt-in to allow their data to be used – a policy that would help citizens feel secure, with positive stories communicated about the value that can be achieved from participating. The IBM team also recommends the creation of customer accounts as a way of ensuring privacy and security when using the City's online services. These accounts could eventually be linked to customer utility account numbers, GIS data and other information to allow citizens to make informed choices and remove administrative complexity across multiple systems.

Table 2: Data Governance Council Maturity Model

Category	Description
Organisational structures and awareness	Describes the level of mutual responsibility between business and IT, and recognition of the fiduciary responsibility to govern data at different levels of management.
Stewardship	Stewardship is a quality-control discipline designed to ensure custodial care of data for asset enhancement, risk mitigation and organisational control.
Policy	Policy is the written articulation of desired organisational behaviour.
Value creation	The process by which data assets are qualified and quantified to enable the business to maximise the value created by data assets.
Data risk management and compliance	The methodology by which risks are identified, qualified, quantified, avoided, accepted, mitigated or transferred out.
Information security and privacy	Describes the policies, practices and controls used by an organisation to mitigate risk and protect data assets.
Data architecture	The architectural design of structured and unstructured data systems and applications that enable data availability and distribution to appropriate users.
Data quality management	Methods to measure, improve and certify the quality and integrity of production, test and archival data.
Classification and metadata	The methods and tools used to create common semantic definitions for business and IT terms, data models, types and repositories. Metadata that bridges human and computer understanding.
Information lifecycle management	A systematic policy-based approach to information collection, use, retention and deletion.
Audit information, logging and reporting	The organisational processes for monitoring and measuring the data value, risks and efficacy of governance.

Recommendation 2.1: Create "MyGeraldton" digital services (continued)

Scope and expected outcomes (continued)

Non-City information
The MyGeraldton portal should be a one-stop shop for the community, with links to other government sites of relevance to Greater Geraldton, since citizens may not understand whether the City, state or federal government is responsible for a topic.

Other non-City information should also be integrated into the City's data warehouse, such as utilities, weather, GIS data and Australian Bureau of Statistics data. This integration would provide a comprehensive view of the region for the community, potential residents and investors, allowing analysis of Greater Geraldton across multiple subject areas.

This data, combined with crowd-sourced and text-based data, such as citizen council correspondence and complaint information, can then be used to provide analysis and, ultimately, enable the community to optimise its resources. For example, the City could identify more direct bus routes that serve the majority of riders or where cultural communities are clustered that might need specific services. The digital youth startup hubs could use the data to create value-added information or services, such as through CivicEvolution competitions and awards.

Smart energy hub information
Information from the smart energy hub (see next recommendation), should be available through the MyGeraldton portal. This will support Greater Geraldton's focus on reducing energy use by promoting a sense of competition and clarity about one household's energy use versus its neighbours.

Recommendation 2.1: Create "MyGeraldton" digital services (continued)

Proposed owner and stakeholders	Suggested resources needed
Owner: City Council **Other stakeholders:** • State-run utilities, such as water and energy • The stakeholders involved in Recommendations 2.3 and 2.4 (startup and digital youth hubs) • Citizens interested in privacy, security and data ownership issues. • Western Australia State Department of Commerce • Western Australia State Department of Finance	Seek a "Royalties for Regions" grant for Digital Government to support services beyond the scope of the recently received grant. IT information management, data warehouse and analytics professionals.

Dependencies	Key milestones, activities and timeframe
This recommendation is linked to implementation of Recommendations 2.2, 2.3 and 2.4 (the hubs) and Recommendation 3.2 (digital tourism).	**Short to medium term:** • Create the MyGeraldton mobile application and portal. • Implement a comprehensive communication and education strategy to gain community acceptance of open data and agreement on the privacy and security strategy. • Review the Data Governance Council Maturity Model and direction for Greater Geraldton. • Define the data model and attributes to be published to achieve a "single view of the citizen" and gain agreement from the community. • Establish a central data warehouse with analytics and metadata (the definition of each data type). **Long term:** • Gain agreement with other government agencies to publish their data. • Add other non-City data to the data warehouse, with additional analytics and optimisation tooling. • Publish the data into an open-source, big data platform, such as Hadoop, as a method of engaging and educating the digtal youth and startup hubs in new technologies that are transforming the information technology industry.

Priority status
Medium

Recommendation 2.2: Create a smart energy hub

The City should create a smart energy hub that aggregates data from multiple sources, generates analytics, and creates learning systems in order to help consumers manage their energy consumption and costs.

Scope and expected outcomes

The projected population growth, as well as expanding mining, infrastructure and energy projects, such as those at Three Springs and Coolimba, combine to put capacity pressure on the existing energy grid and City resources. Equally important is the demand for thousands of new workers and their need for affordable housing.

This recommendation focuses on retaining Greater Geraldton's reputation as the region with the most affordable housing in the greater Mid West, which helps to attract and support the workforce of the future by engaging citizens in active energy and resource management.

Electricity prices in Western Australia are among the highest in the world at AUD$0.248 per kilowatt-hour (kWh). This includes the new carbon tax of AUD 2.255 cents per kilowatt hour to cover the federal government's AUD$23 per tonne impost on emissions. The average citizen consumes 17.3 kWh each day, most of which is non-renewable energy. The City should establish a cloud-based hub to help citizens share information and expertise with the goal of reducing peak power usage by 15-20 percent. (Other recommendations address shifting from non-renewable energy and increasing overall energy capacity to help reach this goal.)

As depicted in Figure 4, the smart energy hub would aggregate energy, water and waste-management usage data, integrated with smart-meter technology, to provide analytics and learning systems that will help citizens reduce peak power consumption and effectively manage water usage.
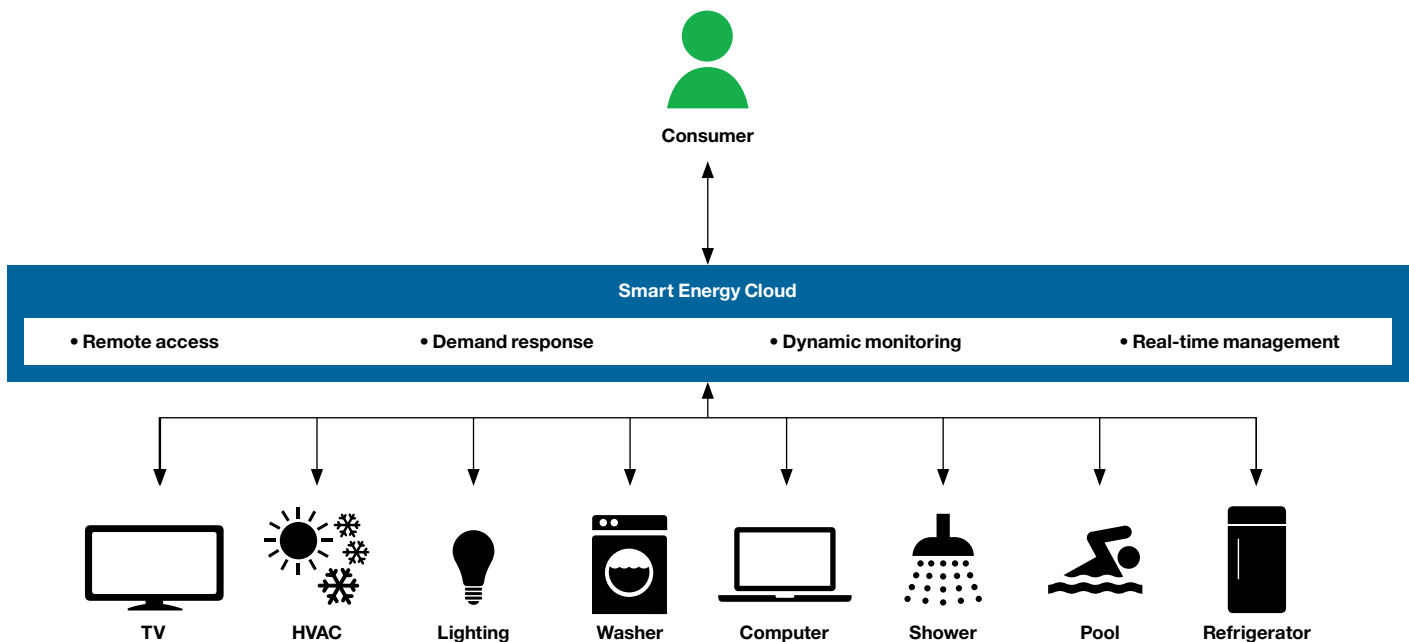

Consumer

Smart Energy Cloud			
• Remote access	• Demand response	• Dynamic monitoring	• Real-time management

| TV | HVAC | Lighting | Washer | Computer | Shower | Pool | Refrigerator |

Figure 4
Flow of information on energy use (from appliances to consumers)

Scope and expected outcomes (continued)

The City should consider incorporating the use of smart meter technology as a condition of approval for real estate developers undertaking the development of new communities, such as the Moresby Heights suburb or Business Technology Park. In these new communities, the City has an opportunity to work with developers to create a "Smart Energy Precinct" as a condition of permit approval. In this precinct, meters for water and energy consumption would be required to transmit data to a central energy hub. Existing dwellings could be retrofitted easily and inexpensively to be included in the energy hub.

The smart energy hub would be compromised of six major components:
- **Consumer energy dashboard.** This is the means by which relevant and consumable data is delivered to City residents by reporting on energy, water and waste-services consumption, both individually and in comparison to other residents. This dashboard would encourage community participation and interaction by using mobile and social media technologies.
- **Integrated operations centre.** This is an executive dashboard of the community's performance against key energy performance indicators. It ingests and correlates the operational events that occur within the day-to-day operations of the smart grid, water and waste-control systems and flags significant events directly onto a geo-spatial map. Utility operators can drill down to understand causes and choose to handle them as formal incidents through standard operating procedures.
- **Business analytics**. These provide insights to government and utility providers on energy operations in the community, including the interplay between the major utility control systems.
- **Building management and optimisation**. Data from in-building control systems, provided to the smart energy hub, will assist in regulating the operation of energy distribution, heating and cooling.
- **Asset management.** Through the aggregation of citywide data into the smart energy hub, the City of Greater Geraldton will be able to achieve a complete understanding of its assets — such as street lights, buildings and vehicle fleet — and their status and maintenance history. By incorporating the appropriate tools to optimise maintenance activity, the City will be able to reduce operating expenses and defer capital expenditure for replacements.
- **Citizen engagement.** This online community facilitates understanding and learning about managing energy consumption. It provides citizens with an interesting, enjoyable way to learn about their own energy habits, simulations of changes in behaviour and information about devices for their home or business. It can feature an "ask the experts" forum and provide ratings and reviews from fellow citizens. There could even be an application that helps communities challenge each other.
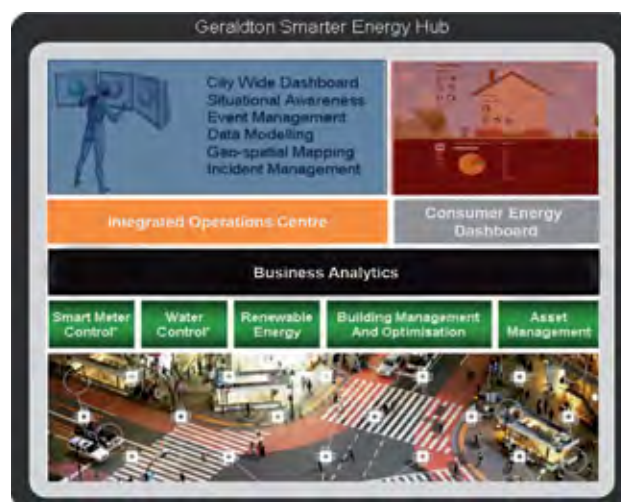

Figure 5
Components of a smart energy hub

Recommendation 2.2: Create a smart energy hub (continued)

Scope and expected outcomes (continued)

The energy hub would provide a simple progression of knowledge to move through three phases of improved energy conservation by consumers: learning, insight and interaction.

Phase I: Learn about consumption patterns
Citizens and businesses would be able to view their energy consumption and compare themselves with neighbours. Customers could be alerted when usage goes above normal, share tips through a social network and "ask an expert" as they learn about energy conservation. The smart energy hub could simulate the impact of changes they could make in:
• Changing behaviour by switching devices off or changing times of operation
• Adding smart meters on their own, such as HomePlug Powerline devices
• Selecting control devices that can be operated through smartphone applications and devices, such as Libellium, Nest, WeMo, Kühl and WeatherTrak
• Selecting appliances that can be controlled remotely from mobile devices when updating appliances, such as Samsung WF457 and DV457 washer and dryers.

Phase II: Insight through predictive analytics
The information collected via the smarter energy hub would:
• Generate consumption trends (hourly, daily and monthly)
• Receive predictive information including weather and external events
• Learn about the collective impact of the grid and the impact on prices
• Understand the carbon impact of electricity consumption

This information could be used by consumers as well as the City and utilities to manage demand and pricing, and inform efforts to reach the community's goal of becoming carbon neutral by 2029.

Phase III: Interact with the grid
In the future, as consumers become comfortable with their smart energy level of knowledge, it may become practical to delegate the control, or partial control, of smart-energy devices to the City or the utility company. For example, citizens may give the utility company the right to turn off air conditioners for a three-minute period to manage peak power consumption.

The City of Dubuque, Iowa, has created a powerful sustainability model that enables its citizens and businesses to adjust their energy and water consumption, achieving reductions in usage of up to 15 percent for electricity use and 7 percent for water. This helps to make Dubuque a desirable destination, where sustainability and a low-carbon environment deliver a highly liveable location with economic advantages.

These actions resulted in Forbes magazine[1] ranking Dubuque first among midsized US cities for projected job growth, while Fast Company[2] placed Dubuque among the world's top ten "Smarter Cities on the Planet" – the only US city granted that distinction.

Detailed project scope:

Step I: Develop the energy hub and connect it to usage data
The IBM team recommends the City facilitate a discussion with Synergy, Western Australia's largest energy retailer, Western Power and Water Corporation to develop a web- and mobile-based visualisation platform through which consumers could easily access and manage their daily energy and water usage. Part of the collaboration would determine who would own and host the energy portal, possibly through a shared-cost model. Overall household consumption data, by account number, could be linked to a citizen account, as mentioned in relation to the MyGeraldton portal.

The City should investigate the feasibility of setting standards for new construction and development to install smart meters and infrastructure sensors, such as for water. The City also should evaluate subsidising commercially available off-the-shelf devices, which typically cost about AUD$150, so that individual devices, such as air conditioners and water heaters, could be individually monitored and their usage transmitted to the hub.

Scope and expected outcomes (continued)

Step II: Build business and predictive analytics

Build a set of analytics and predictive capabilities that works with the usage data to allow utilities to integrate it with weather, load and environmental factors to predict outages and track demand patterns. It should include:

- A visualisation system for feedback to consumers and businesses
- A notification system to alert consumers about their energy consumption patterns
- Social analytics to track the sentiment of consumers and identify areas for improvement or education to improve customer service
- Demand forecasting
- Usage evaluation for pricing policies

Step III: Undertake consumer-utility collaboration

With the permission of consumers, utilities could directly manage remote-automation devices, such as heating or cooling units. For example, in a neighbourhood, it could pause air conditioners for a few minutes, which could be enough to relieve the burden at peak times and still provide comfortable living conditions.

This collaboration would allow consumers to shift the energy usage outside of peak demand times, thereby reducing energy bills and normalising the consumption pattern.

Utilities could defer capital expenditure to meet the growing demand for peak power. Data provided by the smart energy hub could provide utilities with the information to:

- Reduce electricity costs or publish tiered rates to drive behavioural change. For example, during peak times, power could cost AUD$0.30 per kWh and only AUD$0.15 per kWh after midnight. Consumers could then elect to set dishwashers to run at night, when the price is lower.
- Actively reduce carbon emissions.
- Actively shift demand from peak to off-peak hours.
- Increase renewable-energy investments

Step IV: Develop an integrated operations centre

Develop an integrated operations centre for the City and connect information from sensors installed throughout the City with relevant systems and services to assist in:

- Monitoring aggregate consumption of water and energy
- Monitoring spatial and temporal anomalies and changes
- Forecasting demand and consumption at the community level
- City planning and infrastructure development
- Improving the overall quality of life of residents

The implementation of this recommendation will provide the City with an executive dashboard of the City's performance against its key performance indicators. The dashboard would ingest and correlate the operational events that occur within the day-to-day operations of the smart grid, water and waste-control systems and flag significant events directly onto a geo-spatial map. Operators could drill down to understand causes and choose to handle them as formal incidents through standard operating procedures.

Recommendation 2.2: Create a smart energy hub (continued)

Proposed owner and stakeholders	Suggested resources needed
Owner: City Council **Stakeholders:** • Water Corporation • Synergy • Western Power • Horizon Power • Geraldton Port Authority • Department of Planning • Department of Transport • Energy Response Ltd • Extension Hill Pty Ltd • Mid West Chamber of Commerce and Industry	• The City could set standards for the new precincts or provide incentives tied to rebates for property rates. • Water and energy providers would need to publish rates in a way that could be integrated dynamically into a consumer portal. • A business case and feasibility study would need to be undertaken for Western Power (transmission and distribution) to determine a return on investment from hosting an energy hub. • Synergy provides the electricity billing and may need to be involved.

Dependencies	Key milestones, activities and timeframe
The recommendation requires further study to measure the potential impact and cost of implementing smart meters for new business and residential locations, as well as retrofitting existing facilities. It also depends on Western Power's plans for the area.	• Work with Western Power and the Public Utilities Office to develop a business case for Royalty for Regions Funding within six months. • Identify precincts within the city to pilot the implementation of Smart Meters and related technology. Research is required on technology providers that could participate in pilots or future projects, such as: • Libelium – more than 50 sensor applications; wireless sensor networks using Zigbee for smart homes and cities • Nest – smart home solutions using existing power lines that can communicate via modems to the hub • Motion-sensing house lights and streetlights • Automated window coverings

Priority status

Medium

Recommendation 2.3: Create a startup hub

The City should create a physical startup hub, provisioned with digital infrastructure, to incubate new business ventures and initiatives, and facilitate global connections.

Scope and expected outcomes

The startup hub should be a business incubator, ideally run by a startup company as a not-for-profit organisation, in partnership with the Small Business Centre. It would be a multi-purpose and multi-tenanted space, provisioned with fast Internet connectivity, high-definition video conferencing, meeting rooms, "smart mailboxes," hot desks, space for "pop-up stores" and other business facilities that support digital businesses.

Including space within the facility for popular "pop-up stores" stems from observations that e-commerce startups need to move into a physical space as their businesses grow. A pop-up store is an ultra-short-term (days or weeks), small and rapidly established store to service a specific product or promotion. In this context, startups could promote their business in a physical environment, as well as experiment with various formats before making more significant commitments and investments.

The City would need to:
• Secure a suitable physical space and provide basic fit-out and technology infrastructure.
• Appoint a management body and associated operational framework and services.
• Establish a "time-share" business model for usage of facilities.
• Integrate seed-funding programmes.
• Assist in establishing global connections with other business incubators.

Example seed-funding initiatives and assistance:
• AUD $50,000 grant from Western Australia State Government (Round 2 – Innovation Capability Development Program – Western Australia Business Online)

Expected outcomes are:
• Growing the number of startup businesses
• Building a culture of entrepreneurship through promotion of success stories

Critical success factors include:
• Appointing a suitable operator to run the facility and, importantly, establish its culture, brand and direction
• Securing anchor tenants aligned to the vision

The early priority is to create a physical space for entrepreneurs to meet and have access to facilities that support or enhance their business. Once momentum is established, a social network could be created via the MyGeraldton portal to extend the hub into a virtual community throughout the Mid West region.

Recommendation 2.3: Create a startup hub (continued)

Proposed owner and stakeholders	Suggested resources needed
Owner: City Council **Stakeholders:** • Small Business Centre • Small Business Development Corporation	This requires a building, but it does not need to be a new one. Priority should be placed on a location central to business services and the City's commercial centre.

Dependencies	Key milestones, activities and timeframe
• Receipt of seed-funding grant	• Apply for seed-funding grant within three months. • Once grant is approved, appoint a champion to promote the hub and lead by example • Secure a suitable building. • Secure an anchor tenant.

Priority status

Medium

Recommendation 2.4: Create digital youth hubs

The City should create age-appropriate physical spaces at various locations that offer free and fast wireless connectivity in safe environments for youths to build the right digital culture, skills and global connections.

Scope and expected outcomes

Digital youth hubs would be physical, multi-purpose spaces, providing free and fast wireless Internet connectivity for youths to congregate, collaborate and create.

Multiple hub locations should be created, based on age groups and input from youths. The centres should be designed and priorities defined by youths, under the direction of a youth leader, as part of a council-funded initiative. Also, a youth council should be established, and its leader included as an advisor to the Greater Geraldton City Council to provide the voice of youths in community initiatives.

Additionally, an adult youth coordinator should be hired as an employee of the youth council, based at the hubs, and fulfil a dual role:
• Support members of the youth council in their interactions with the Greater Geraldton City Council and City managers.
• Manage the day-to-day operations of the facilities, including marketing and community-engagement activities.

The scope of this recommendation includes:
• Secure suitable physical spaces, and provide basic fit-out (designed in consultation with the youth council), including Internet infrastructure.
• Set up special interest groups anchored at the centre, such as a CoderDojo@Geraldton to be a free coding club for youths.
• Establish a youth council to provide the voice of youths to the Greater Geraldton City Council.
• Gain the support of interested parties, such as schools and existing youth groups.

Potential initiatives might include:
• "Digital clubs," such as CoderDojo, could be created. Online gaming clubs for multi-player online gaming should be formed. It is important to have clubs linked to national and international groups to nurture a global perspective among youths.
• Establishment and promotion of the CoderDojo culture should occur. Issues about Internet and social media misuse should be addressed through a youth-championed culture.
• Interest and awareness in the opportunities offered by technology should be promoted.

The early priority is to create physical spaces for youths to meet. Once momentum is established, a social network could be created via MyGeraldton that would extend the youth hubs into virtual communities throughout the Mid West region.

About CoderDojo
At a CoderDojo, young people learn how to write programming code to develop websites, applications, programmes and games. Dojos are set up, run by and taught by volunteers. Dojos organise events and tours of technology companies, and bring in guest speakers to talk about careers.

In addition to learning to code, members meet like-minded people to discuss their projects. CoderDojo makes development and learning to code a fun, sociable experience. It puts a strong emphasis on open-source and free software, and has a strong, global network of members and volunteers.

Recommendation 2.4: Create digital youth hubs (continued)

Proposed owner and stakeholders	Suggested resources needed
Owner: City Council **Stakeholders:** • City chief executive officer • Members of the proposed youth council (new) • Local elementary and secondary school principals • Other existing youth group leaders	This requires one or more buildings, but they do not need to be new. Priority should be placed on locations that are easy for youths to safely access. Youths should be involved in customising their internal and external characteristics.

Dependencies	Key milestones, activities and timeframe
This requires funding for space and to hire a suitable adult coordinator who can shape the correct culture and image for the hubs, so that is perceived as a "cool" space and attracts appropriate youth groups.	• Determine the creation and selection of the youth council within six months. • Establish practical mechanisms for the youth council members to engage with the Greater Geraldton City Council on youth initiatives and ideas. • Secure suitable physical locations once support funding is approved and an adult youth coordinator is hired. • Identify and engage local volunteer mentors.

Priority status
High

Recommendation 3.1: Develop a workforce of the future

The Leadership Alliance should facilitate the sharing of digital resources among local high school, trade and university facilities for custom digital learning and collaboration to create advanced skills that attract research and employers to the region.

Scope and expected outcomes

Local public and private education providers – secondary and tertiary – should create a local consortium to share existing and future technology resources in order to expand education, health and research services, and to connect the local education community to intra-state, interstate and international resources.

Educational uses
A set of shared digital technology rooms should be created at each high school, education and research campus with the latest e-learning and e-meetings technology, such as Polycom, RealPresence and Huawei Telepresence. This e-learning enablement could be jump-started at the "education and health precinct" (of which the Geraldton University Centre is a part) as an initial starting point for the shared rooms, before rolling out to the broader group.
- Collaboration between schools would be improved, such as fostering cross-school group projects, as well as sharing scarce subject-specific teacher resources, such as linking high schools in Geraldton and Mullewa.
- Collaboration could be achieved using a sister-cities approach, involving an overseas high school to enable local students to communicate and understand technology and career opportunities from international peers.
- Overseas students could attend university in Greater Geraldton for at least one year of their degree programme in a native English-speaking environment, while continuing to interact with online classes from their home university.

Community uses
These same digital technology rooms should also available to the larger community for sharing knowledge of technology and collaborating with other communities. For example, students' parents should have the opportunity to learn about technologies so they can understand the new possibilities e-learning brings to their children.

Health and wellness uses
This could help to provide proactive health and wellness information, with culturally specific information for the region, by using a technology-based, "face-to-face", interactive approach through high-speed videoconferencing. Learning could include topics such as diabetes management and how to perform emergency surgery in the Outback.

As these initiatives are implemented, Greater Geraldton would be seen as a key education, health and research hub in Western Australia, with more educational opportunities, helping to retain students while increasing awareness of their career options.

Recommendation 3.1: Develop a workforce of the future (continued)

Proposed owner and stakeholders	Suggested resources needed
Owner: Initially this recommendation would be facilitated by the Leadership Alliance, with long-term ownership by key stakeholders. **Stakeholders:** Education, health and research providers, including: • High schools • Geraldton University Centre • Durack Technology Institute • Combined Universities Centre for Rural Health • The Commonwealth Scientific and Industrial Research Organisation (CSIRO) • Square Kilometer Array • Mid West Economic Development Council	• State government "Royalties for Regions" funding • Federal education grants

Dependencies	Key milestones, activities and timeframe
• Creation of Leadership Alliance (Recommendation 5) • Completion of Recommendation 1.1 (GIX) • Willingness of existing university and research institutions to share access to their existing technology resources	**Short term:** • Gain agreement from local education and health communities regarding sharing resources and setting priorities among initiatives. • Determine funding through discussions with stakeholders and state and federal government regarding the NBN-enabled education and skill services programme grants. • Review technology requirements and priorities for technology placement, as it may not be possible to fund all locations concurrently. • Develop joint administrative procedures regarding access and reservations of digitally-enabled rooms.

Priority status
High

Recommendation 3.2: Use digital technology to showcase Greater Geraldton internationally

The City should leverage digital technologies to expand the marketing of Greater Geraldton to potential residents and tourists, current visitors and the local community.

Scope and expected outcomes

The City should expand its use of digital marketing to reach the broadest possible audience, through channels such as YouTube, Facebook, web-based applications and interactive digital displays.

Tourism
Create a Greater Geraldton tourism channel on YouTube to display videos of the city. Video content could be obtained via crowdsourcing, including a quarterly competition, by distributing several video cameras to high school students and community organisations.

Retail
Increase awareness of tourism opportunities in the small-business community by piloting and showcasing initiatives. For example, the local Yamaji aboriginal community could pilot digital technology to showcase their art, accept electronic payments and interactively share their culture via Facebook or a YouTube "Dreamtime" channel in order to attract tourism to the local area. This could be done in conjunction with the digital youth and startup hubs, with the focus on evolving the community's digital presence through new technologies.

Local events
Encourage and mentor local community groups in their use of digital technology to showcase the variety of local events, such as farmers' markets, rodeos, festivals and other cultural events, through the use of crowd-sourced content.

Content creation
The digital youth and startup hubs can be a source for the creation and usage of digital technologies, as well as a method of "on-the-job" training, supporting "workforce of the future" initiatives, and increasing collaboration in the community. This crowd-sourced content would then be delivered via multiple methods:
• **Focus first on content for mobile devices** – Create a mobile and web-based application that highlights local events and provides special offers. They would be funded by local business advertising, ideally with built-in location awareness providing special offers, especially for the Central Business District.
• **Accessibilit**y – Create an "accessibility" application that provides a disabled visitor his or her GPS location and helps them find the nearest point of interest that has the level of accessibility they require. For example, Nettuno, a small city near Rome, wanted to ensure that everyone would be able to visit their historical sites and developed an application that assisted disabled visitors, who comprised 10 percent of the city's annual 300,000 visitors.
• **Mass-audience marketing** —Implement interactive digital signage in the City's foreshore area, as a way to remotely tailor content at point of sale or at sites where travel decisions are typically made.
• **Social media** – The initial focus on YouTube and crowdsourcing content could be extended to other forms of social media, such as Twitter, and Pinterest, as well as Asian equivalents, such as Tencent, RenRen, Sina Weibo and Wechat. The City should also implement a social media management system capable of generating analytics and publishing content.

Such initiatives should increase tourism, increase participation in local events by residents, improve the technology skills of youths, and increase understanding and pride in local culture.

Recommendation 3.2: Use digital technology to showcase Greater Geraldton internationally (continued)

Proposed owner and stakeholders	Suggested resources needed
Owners: City Council and the Greater Geraldton Tourist Bureau **Other stakeholders :** • Yamaji leaders and Yamaji Art Centre • Chamber of Commerce (daily offers) • Small Business Centre • Youth council • Startup hub • Disability Services WA • Mid West Community Living Association	Digital hub and digital enterprise grants could be leveraged, as well as the Small Business Centre.

Dependencies	Key milestones, activities and timeframe
• Recommendation 1.2 (Wi-Fi network) • Recommendations 2.3 and 2.4 (hubs)	**Short to medium term:** • Gain agreement from Yamaji elders and the existing Yamaji Art centre in Geraldton. • Create a YouTube channel for Geraldton tourism. • Use the CivicEvolution competition and awards to gain submissions highlighting the best of the city. • Install interactive digital displays. • Create a programme among small businesses to provide special offers. • Leverage the digital youth and startup hubs for expertise and enthusiasm. • Determine and implement measurement and monitoring.

Priority status

Medium

Recommendation 4.1: Develop a "virtual power plant"

The Leadership Alliance should facilitate a distributed network of small-scale generators and storage sources that can be connected to create a "virtual power plant". The data aggregated from the generators and storage sources can be used to manage peak consumption and balance the load on the electricity grid.

Scope and expected outcomes

Centralised energy distribution is becoming increasingly inefficient in meeting modern energy demands. As energy is produced, the vast majority is wasted in the form of energy loss during transmission and distribution. Energy providers must build capacity to meet peak demand, which can equate to approximately 25 percent of the total annual capacity of a power station being used in just 150 hours per year, typically during periods of extreme temperatures.

Globally, billions of dollars are invested to meet this peak energy demand. And even though carbon taxes have been imposed in Australia, consumers continue to use the majority of their electricity during peak hours for air conditioners, large screen TVs and digital devices. This could result in power bills doubling by 2015.

With the advent of smart meters and the widespread availability of the Internet, new opportunities have arisen to locate alternative sources of energy closer to the point of consumption – at homes and businesses – where any excess capacity can be supplied back into the grid. This "win-win" scenario helps utilities defer capital expense, reduce labour costs (especially in manual meter reading) and decrease peak loads. It provides consumers with an opportunity to modify behaviour and reduce escalating energy costs.

Another benefit is that intelligent home networks and the efforts of informed consumers can also shift consumption away from peak hours and balance the base load at a higher level, as depicted in Figure 6.
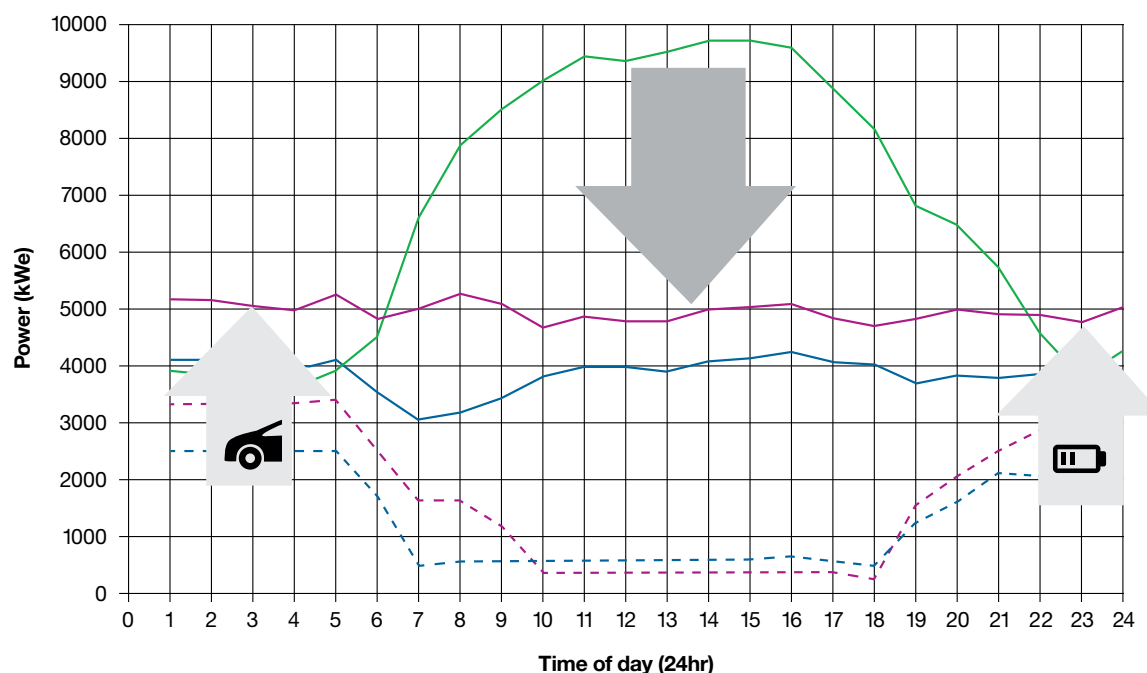

Figure 6
Energy demands peak in the middle of the day but can be reduced if managed smartly

Recommendation 4.1: Develop a "virtual power plant" (continued)

Scope and expected outcomes (continued)

Pilot projects are beginning in Western Australia to deploy smart meters in some areas over a five-year period from 2013, but it will be some time before the Mid West region would benefit.

Greater Geraldton presents a unique opportunity to explore the potential of implementing co-generation, storage and small-scale renewable energy solutions at the community level. The right on-site, co-generation facility could deliver a significant improvement in generation efficiency, compared with the typical 30-percent efficiency of a coal-fired power station. When the control and operation of these energy sources is integrated, it translates to energy affordability and efficiency – lowering cost, minimising carbon footprints and improving power reliability for residents.

The IBM team recommends piloting a "virtual power plant", where a network of small generators and energy-storage devices are installed by an individual or the City, and the generation data is aggregated into the integrated operations centre (see Recommendation 2.2), providing a clear overview of the small-scale renewable capability of the City. The aggregation of the collective capacity and data across the entire grid forms a "virtual power plant" that can support portions of peak demand to collectively assist in balancing the grid during peak periods. Figure 7 illustrates how a virtual power plant contributes to the energy system.

A "virtual power plant" involves the development of a network of small-scale, connected energy devices, which can include standalone systems such as co-generation ceramic fuel cells, electric vehicles and solar photovoltaic systems. For example, a BlueGen fuel cell provides the additional advantage of supplying up to 200 litres of warm water, which can be used to supplement existing hot water tanks.

The potential is significant. Other cities, such as Dubuque, Iowa (USA), have employed strategies to reduce peak load by as much as 15 percent. In other examples, the canton of Zurich, Switzerland, worked with the utility provider EKZ to use predictive analytics to validate the opportunity for an electric vehicle pilot project that was expected to shift up to 50 percent of the charging time back into the grid to reduce peak usage.

A "virtual power plant" could consist of many renewable energy sources, including:
- Solar photovoltaic systems
- Ceramic fuel cells
- Electric vehicles
- Battery storage

As an example, a "virtual power plant" strategy including 2,000 electric vehicles, a 10 percent peak load reduction, along with a digital hub strategy that reduces the need for travel between Perth and Geraldton for medical, commercial and education services, could potentially result in a reduction of carbon emissions of around 30,000 tonnes of CO_2 equivalent (tCO2e) – twice the amount generated by the City operations annually.

Small-scale local pilots
One alternative is to proceed with small-scale local pilots without waiting for state-led capital projects. This also would allow Greater Geraldton to reduce carbon emissions and move closer to achieving its goal of becoming a carbon-neutral zone.
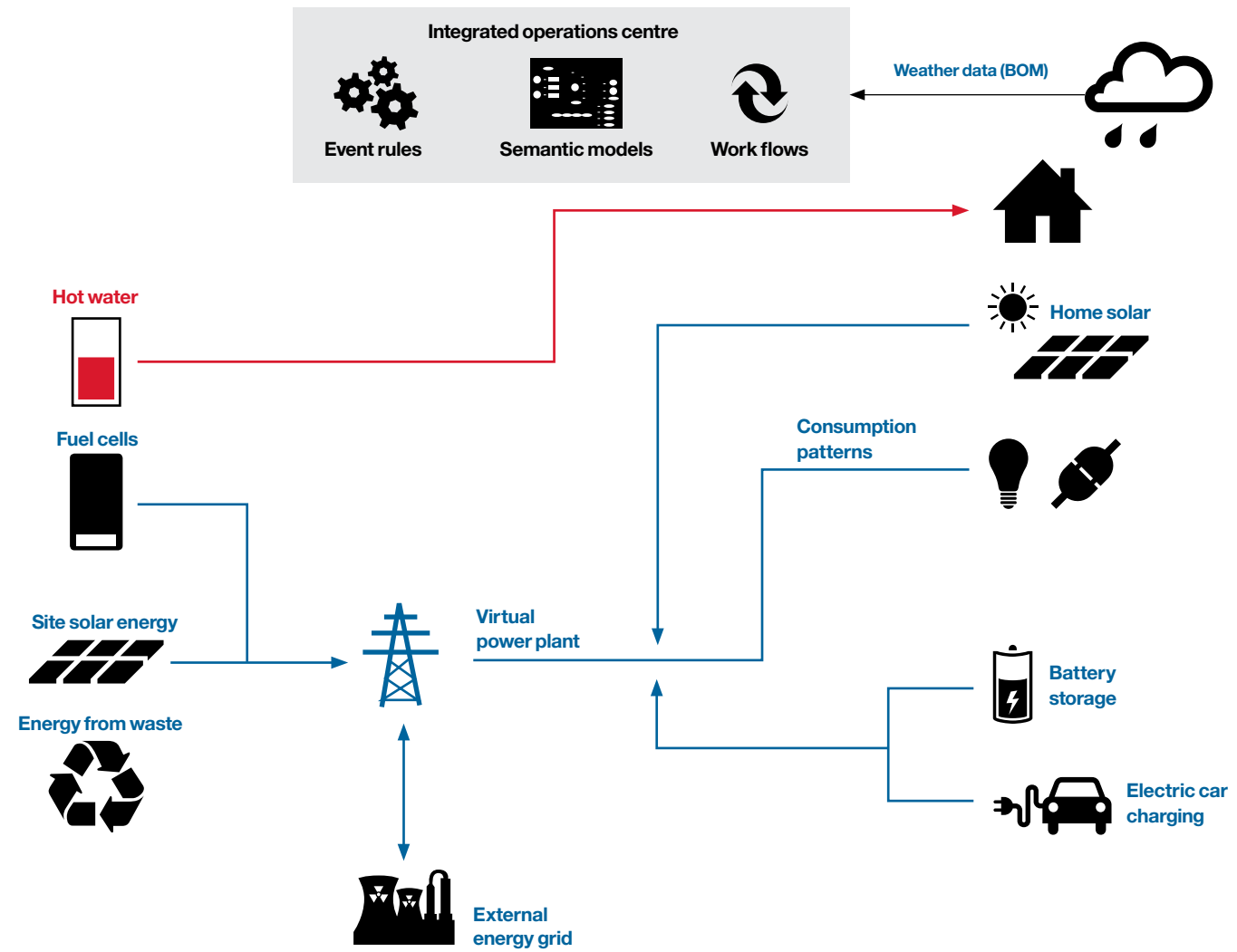
Integrated operations centre

Event rules

Semantic models

Work flows

Weather data (BOM)

Hot water

Home solar

Fuel cells

Consumption patterns

Site solar energy

Virtual power plant

Energy from waste

Battery storage

Electric car charging

External energy grid

Figure 7
Schema of a virtual power plant

Recommendation 4.1: Develop a "virtual power plant" (continued)

Proposed owner and stakeholders	Suggested resources needed
Owner: Initially, this recommendation would be facilitated by the Leadership Alliance (see Recommendation 5). In the longer term, there are three potential types of storage-reserve owners: • Individually owned • Commercially owned • City-owned **Stakeholders:** Utility providers Western Power and Horizon Power.	Two key resources include: 1. **Education:** There is a critical lack of understanding as to the devices available to retrofit existing homes and buildings, as well as how to build new "smart homes" with energy storage capacity. 2. **Skilled and certified contractors:** There is a need for educational facilities to train qualified consultants, sellers and suppliers.
Dependencies	**Key milestones, activities and timeframe**
A key dependency is the ability of Western Power and Horizon Power to be able to accept excess energy back into the grid and provide rebates.	• **Phase I:** Collaboration occurs between the City of Greater Geraldton and utility providers to validate the opportunity, including community communications and education to garner acceptance of the approach. • **Phase II:** Develop pilot programme proposal with BlueGen (ceramic fuel cells), Siemens (electric vehicles) and small-scale solar photovoltaic companies. • **Phase III:** Integrate data for all generation sources into the proposed integrated operations centre provided by the smart energy hub (see Recommendation 2.2). • **Phase IV:** Collaborate with the Durack Institute of Technology to develop a programme for skills development. • **Phase V:** Conduct marketing and trials.
Priority status	
Medium (high for pilot)	

Recommendation 4.2: Create a renewable-energy initiative

The Leadership Alliance should facilitate a visionary initiative to create large-scale renewable energy projects in the Mid West region to replace carbon-intensive power plants.

Scope and expected outcomes

The extensive magnetite and haematite reserves in Western Australia's Mid West region are a key component of Australia's position as one of world's major producers of iron ore. There are a number of new mining projects being developed in the Mid West region and all will require significant power. If all five of the planned major mines are commissioned, the revenue potential for the state would be approximately AUD$15 billion per annum with state royalties of about AUD$1.125 billion revenue per annum (based upon 30 million tons per annum, per mine, at AUD$100 per ton, with a 7.5 percent royalty tax).

The reliability of an energy supply is a crucial factor for the mining industry when selecting a provider, since they are exposed to revenue penalties in the event of process interruptions. Renewable energy is generally viewed as unreliable for providing energy at short notice, in response to market demand. This means that any solution chosen must be a mix of conventional generation and renewable energy. There are two main constraints for the commissioning of the mines in the Mid West region:
- Mining sites require access to infrastructure, including railways, ports and power supplies.
- Carbon tax and Mining Royalty (MRRT) taxes are imposed.

A lack of a reliable power source will prevent infrastructure development, preventing the viability of the mine and resulting in no revenue for the industry or the government.

The forecasted power demand by 2020 for Geraldton and the Mid West region are:
- Forecasted mining sites' power requirements: 1.8 gigawatts
- Geraldton's power requirement with proposed growth rate: 100 megawatts
- Oakajee Port and Rail project (once fully commissioned): 20 megawatts
- Oakajee Industrial Park (once fully commissioned): 80-100 megawatts

This equates to an added power capacity requirement for the greater Mid West region of approximately two gigawatts to service the estimated demand by 2020.

Several factors complicate the situation:
- There is a carbon tax and a financing cost. Renewable-energy sources have higher initial capital costs, while fossil-fuel sources have highly variable fuel costs.
- The potential energy demand of the proposed new mines is approximately two gigawatts, which means there would be increased demand for power, potentially resulting in higher carbon emissions.
- Current projections may not accommodate this significant increase in power requirements for mining in the region.
- State Government wants to avoid a "build it and they will come" strategy, preferring secured demand prior to investment commitment.

There are two scenarios that should be investigated:
1. Normal on-site power via fossil fuel for the mines would lead to high carbon-dioxide (CO_2) emissions and impact the financial viability of the mines, since they must finance the upfront capital costs for the onsite power generation.
2. Development of a clean, interconnected grid would reliably provide base-load supply to the mining sites through a mix of reliable, renewable-energy sources, such as solar thermal and geothermal energy, and conventional generation sources, such as fossil fuels.

Recommendation 4.2: Create a renewable-energy initiative (continued)

Scope and expected outcomes (continued)

The IBM team recommends a second scenario: Replace the proposed on-site, fossil-fuel power plants within the Mid West region with a mix of renewable energy and fossil fuels that could reliably supply both base load and periods of peak consumption. This would help Geraldton and the Mid West take advantage of the abundance of renewable-energy sources (including wind, solar, hydro, geothermal and biomass technologies) to create a more sustainable and carbon-neutral zone, and enable Western Australia to become a leader in renewable energy. Similar projects are currently being finalised in Europe and Africa.

The alternative – relying exclusively on on-site generation, including diesel and gas-fired power stations – would tie Western Australia to highly volatile and rising international oil and gas prices.

Potential of renewable energy

There is significant renewable potential in Geraldton and the Mid West region that can be leveraged to provide clean, reliable energy to the region and support current and future demand. This availability can be summarised as shown in Figure 8.

By implementing clean, renewable energy to support the Mid West and mining sites, there would be a significant reduction in greenhouse-gas emissions produced by coal power plants. Whilst gas and coal will still be required to make a contribution, renewables can become a major element of the new, sustainable grid.

Areas for investigation
- Investigate aggregate demand from the mines, through the provision of high-voltage transmission infrastructure, to give them access to green power and reduce capital financial costs.
- Investigate the large-scale opportunity for clean-energy generation.
- Investigate the correct balance of reliable, renewable energy to support base load for mining sites, supported by a mix of other forms of renewable energy and fossil-fuel power.
- Investigate international emission treaties (such as the Kyoto Protocol) to understand the benefit of crediting carbon certificates to international companies who mine resources in Australia using renewable energy.
- Create a relationship map of all potential private and government investors and stakeholders who would contribute to this project.
- Develop a business case, cost-benefit analysis and roadmap of deliverables and expected outcomes.

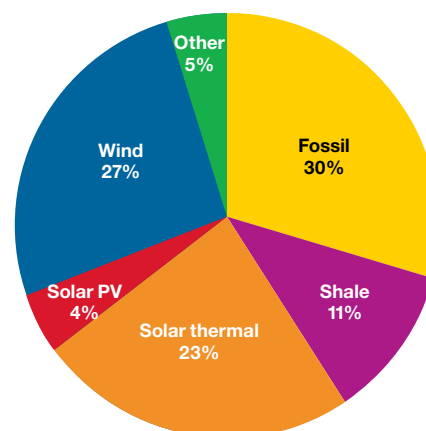|	
Solar thermal (CST)	500 MW
Solar PV	100 MW
Wind	500 MW
Wave	50 MW
Geothermal	50 MW
Shale	250 MW
Biomass	10 MW

Figure 8
A sample mix of reliable, dispatchable renewable-energy sources, supplemented by fossil fuels

Recommendation 4.2: Create a renewable-energy initiative (continued)

Proposed owner and stakeholders	Suggested resources needed
Owner: Initially, the Leadership Alliance should facilitate this initiative. In the longer term, there are several potential owners: • Private investors (local and international) • Oakajee Port and Rail • Mining companies in the greater Mid West • Utilities companies (Verve, Western Power and Horizon Power) • Federal government The Leadership Alliance could be a facilitator in convening stakeholders and qualified parties to undertake the study.	A key requirement would be the engagement of a multi-stakeholder partnership among companies, government and non-governmental organisations in gathering the required input and information to build a roadmap and pathway for the Mid West region to realise the investment.

Dependencies	Key milestones, activities and timeframe
There are no clear dependencies on the delivery of the proposed study and this can be initiated immediately. The dependency on delivery of such a proposal is based on whether the current government policy is maintained (that is, waiting for demand before commitment).	• **Phase I (completed by June 2013):** Initiate the services of a consulting firm to further investigate the viability of the proposal and develop a clear roadmap and business case. • **Phase II (completed by December 2013):** Hold workshops with key stakeholders and investors about the proposal, and create a Renewable Energy Foundation that will govern all decisions and deliverables of the project. Engage with similar type of projects globally to garner best practices, lessons learned and support for the initiative.

Priority status
High for the investigative report

Recommendation 5: Launch a Leadership Alliance to drive results

The mayor should create a Leadership Alliance tasked with developing and executing an action plan to ensure the community works toward a common vision.

Scope and expected outcomes

The existing Greater Geraldton Economic Alliance (GGEA) should sponsor the proposed Leadership Alliance, formed to bring stakeholders together to work towards a common vision for the City, ensure results are managed and progress is tracked through to completion. To do this, the Leadership Alliance should meet frequently, perhaps every two weeks in the early stages, to create focus, a sense of urgency and a drive for completion.

The Leadership Alliance would consist of eight individuals:

- Five deputies from the organisations that comprise the GGEA: The City of Greater Geraldton, the Chamber of Commerce and Industry, the Geraldton Port Authority, the Midwest Development Commission and Regional Development Australia – Mid West Gascoyne.
- Three members from local industry and the citizens of Geraldton. One of these would act as an independent chair of the Leadership Alliance. It is important that the chair is not associated with an existing organisation within the GGEA.
- An independent secretariat should be funded jointly by all the members of the GGEA.

The Leadership Alliance should be augmented with working groups formed around key initiatives to ensure wider community engagement. The outcome of the Leadership Alliance would be results that are more visible to both citizens and non-citizens through a much-improved web presence (see Recommendation 2.1).

The benefit of creating this alliance is that there would be a common vision, common ownership and a commitment to action. Currently there is no single governance body that pulls ideas and plans together; there are many good proposals on paper, but few tangible results. The cost of inaction is a continued perception by citizens that plans are not followed through to completion.

Proposed owner and stakeholders	Suggested resources needed
The Mayor should commission the Leadership Alliance and designate the three additional members, including the chair, based on the advice of the GGEA. Other critical stakeholders include the members of the Greater Geraldton Economic Alliance: • City of Geraldton • Chamber of Commerce and Industry • Geraldton Port Authority • Midwest Development Commission • Regional Development Australia – Mid West Gascoyne	The cooperation of the eight proposed Leadership Alliance Members. Additional resources for the individual citizen/industry working groups to be identified as key initiatives are proposed.
Dependencies	**Key milestones, activities and timeframe**
This recommendation is dependent on the Mayor and GGEA chartering and appointing the Leadership Alliance.	A short-term recommendation is that the first meeting be held by 31 December 2012.
Priority status	
High	

5. Conclusions

The City of Greater Geraldton has a long-term vision that includes significant growth during the next two decades, becoming a model, carbon-neutral city that is becoming digitally connected with the rest of the world. Compared to cities of similar size, Greater Geraldton has the opportunity to turn this vision into reality through its abundant access to five forms of renewable energy – solar, wind, waves, geothermal and biomass – a Mediterranean climate, a beach location along the Indian Ocean, and an enormous potential for new short-term and long-term mining projects. Additionally, it will be among the first beneficiaries of the National Broadband Network (NBN), bringing the opportunity for greater Internet connectivity and enabling a greater local, regional and global presence.

If all these advantages are leveraged to create a common action plan around the community's vision, the City of Greater Geraldton and the surrounding region have the potential to become a Smarter Cities model for economic growth and energy efficiency within Australia and around the world. Critical to its success will be a community-chaired governing body that will drive the action plan, set priorities, determine milestones and track progress, which the IBM team believes will work well with Greater Geraldton's focus and support on a deliberative democracy approach.

Based on the IBM team's findings, through interviews with the City, business leaders, youths, entrepreneurs and the community, the key to success will be to implement short-term projects quickly. Once citizens start to see visible results from these short-term initiatives, gaining their support for the next wave of projects will be far easier. Each phase will build on the prior phases, and Geraldton's citizens, once they begin to take pride and ownership in the vision, will create their own lasting legacy.

6. Appendix

A. Acknowledgements

Name and title	Organisation
Greater Geraldton officials	
Arbuthnot, Neil – Director, Community Infrastructure	City of Greater Geraldton
Brun, Tony – Chief Executive Officer	City of Greater Geraldton
Carpenter, Ian – Mayor	City of Greater Geraldton
Davis, Bob – Chief Financial Officer	City of Greater Geraldton
Godfrey, Karen – Manager of Economic Development and Innovation	City of Greater Geraldton
Hartman, Tom – Place Manager, City of Mullewa	City of Greater Geraldton
Hedges, Maria – Senior Systems Analyst	City of Greater Geraldton
Jacobs, Steven – Mullewa Youth Centre Coordinator	City of Greater Geraldton
Kopplhuber, Janell – 2029 Coordinator	City of Greater Geraldton
McIlswaine, Neil – Deputy Mayor	City of Greater Geraldton
Melling, Phil – Director, Sustainable Communities	City of Greater Geraldton
Ritzinger, Ralf – IT Manager (acting)	City of Greater Geraldton
Rolston, Jenny – Manager, Customer Relations and Tourism	City of Greater Geraldton
Selvey, Andrea – Director, Creative Communities	City of Greater Geraldton
Wood, Cheryl – Director, Organisational Performance	City of Greater Geraldton
Education	
Adam, Fraser – Centre Manager	Combined Universities Centre for Rural Health, Geraldton (CUCRH)
Beevers, Bert – Managing Director	Durack Institute of Technology
Duffield, Tony – Principal	Gerald Grammar School
Hall, Maeva – Assistant Professor	Combined Universities Centre for Rural Health, Geraldton (CUCRH)
Jamieson, Rob – Head of Instruction	Geraldton Grammar School
Nichols, Paul – Director, Strategic Projects	Curtin University
Simmons, Garry – Principal	Geraldton Senior College
Tanner, Declan – Principal	Nagle Catholic College
Wills, Meredith – Director	Geraldton Universities Centre
Local businesses and entrepreneurs	
Barras, Tania – Owner	Love, Lust and Lingerie
Beamont, Euan – Director and Co-founder	Energy Farmers Australia
Broido, Victor – Co-owner	Digidna.net

Name and title	Organisation
Bucu, Maggie – Owner	WAZNME
Carmichael, Tony – Area General Manager	Telstra
Kelly, Liz – Owner, Family History Specialist	LinKin 2 Kin
Lee, Darren – Managing Director	Market Creations
Newman, Paul – Project Manager	Market Creations
Outhwaite, Andrew – Executive Officer	Pollinators
Reed, Linda – Owner	Recycled Designer
Watson, Sharon – General Manager	Market Creations
Mid West Digital Strategy Working Group	
Bradley, Allan – Executive Officer	Regional Development Australia – Midwest Gascoyne
Canny, Mark – Climate Change Coordinator	Northern Agricultural Catchments Council
Condon, Neil – CEO	MW Regional Development Commission
De Trafford, Richard – Computer Services Officer	Combined Universities Centre for Rural Health, Geraldton
Earnshaw, Mike – Owner	Not a Geek
Edwards, Martyn – Acting Program Director, Construction and Resources	Durack Institute of Technology
Ho, Jimmy – Economics Development Officer	City of Greater Geraldton
Keyser, Gavin – Business Development Manager	Market Creations
Metcalfe, Gail – Managing Director	Mid West Business Coaching and Consulting
Murszewski, Adam – Project Manager	Mid West Development Commission
Smith, Susan – City Librarian	City of Greater Geraldton
Toovey, Andrew – Owner	2V.Net IT Solutions
Mid West Small Business Centre	
Gill, Lana – Assistant Secretary	Mid West Small Business Centre
Lake, Trevor – Treasurer	Mid West Small Business Centre
Saint, June – Business Field Officer	Mid West Small Business Centre
Utilities and service providers	
Bishop, Shane – Sales Manager	Node1
Bourke, Brendan – Manager, Strategic Opportunities and Relationships	Horizon Power
Brown, Peter, founder of Westnet (now part of iiNet)	Private entrepreneur
Callocher, Damian, Director	Chamber of Minerals and Energy
Reid, James – Western Australia Sales Manager	Nextgen

Name and title	Organisation
Stewart, Adrian – Regional Manager	Western Power
Tweedie, Gavin – Senior Network Engineer (iiNet), Board Member (WAIA)	iiNet & WA Internet Association (WAIA)
van Namen, Nick – Co-founder	Node1
Government agencies and non-profit organisations	
Allen, Jenny – Board Member	Mid West Chamber of Commerce and Industry
Beven, Jody – President	Mid West Chamber of Commerce and Industry
Finlay, Anne – Project Manager, Infrastructure and Business Development	Mid West Development Commission
Headley, Bill – Chief Executive Officer	Mid West Chamber of Commerce
Klein, Peter – Chief Executive	Geraldton Port Authority
Morrissey, Anita – Office Manager	Mid West Employment & Economic Development Aboriginal Corporation
Schnickel, Ant – Australian Square Kilometer Array Pathfinder (ASKAP) Director and Theme Leader	Commonwealth Scientific Industrial Research Organisation (CSIRO)
Spurgeon, Dion – Telemedicine for Mid West	WA Health
Wyatt, Jim – general manager, Digital Economy	Department of Commerce
Arts and culture	
Belcher, Catherine – Regional Manager	WA Museum
Davies, James – Director	Geraldton Regional Art Gallery
Partners and consultants	
Bartlett, David – Director and Strategist	Explor Consulting
Hartz-Karp, Janette – Professor	Curtin University
Oates, Marcus – Regional Manager	Siemens
Silvia, Larry – Civil Engineering Associate	Aurecon
Willis, Ray – Sustainable Energy Association of Australia	Smith & Duda Consulting
Citizen involvement	
Derek Councillor	The Yamaji community
Members of the Community Trustee Committee	
Students from Geraldton Senior College	
Students from Nagle Catholic College	

B. Team biographies

John Constantopoulos
IBM Energy and Utilities Industry, Solutions Manager, Perth, Australia

John Constantopoulos is an Energy and Utilities Industry Solutions Manager and Subject Matter Expert for IBM's Energy and Utilities Sector. He is responsible for developing and enhancing industry solutions, analysing the shifts and trends in technology and the market, and shaping the investment of IBM's industry solutions.

John M. Kamensky
Senior Fellow IBM Centre for The Business of Government Washington, D.C., United States

John Kamensky is a senior fellow with the IBM Centre for The Business of Government, where he is passionate about helping transform government to be more results-oriented, performance-based, customer-driven and collaborative in nature. He works with government, academia, non-profit organisations and industry to connect research to practice.

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Melissa Downer is the IBM software director for the western region of the United States, including Alaska and Hawaii. Her responsibility spans the breadth of the IBM software portfolio on distributed systems, as well as the mainframe. She leads a team of approximately 650 technical software professionals and competitive sales specialists.

Catherine Lord
Senior Strategist IBM Social Business Victoria, Canada

Catherine Lord is a senior strategist for IBM Social Business, responsible for measuring future shifts in technology, the economy and the global workforce to assess how they will impact the ways organisations interact and collaborate with their workforce, customers, citizens, patients or partners.

Ann Valencic
Executive Software Architect
IBM Software Group
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David Yip
IBM Smarter Planet and Cities
Technical Leader
Melbourne, Australia

Ann Valencic is a senior software architect for IBM. Her role is to work with clients to understand their business, focus areas and requirements, and to position how the breadth of IBM's software technology can assist in achieving their business goals. She has a strong background in information management and data warehousing.

David Yip is an experienced business and technical leader, currently serving on IBM's Global Smarter Planet team as the lead architect for Smarter Energy, Smarter Water and Smarter Cities solutions in Australia and New Zealand. This is a cross-organisational role that aims to integrate the best capabilities of IBM's software, hardware, services and Business Partners to bring innovation to key infrastructure sectors.

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Useful links

BlueGen (small-scale electricity generator).
www.cfcl.com.au/bluegen
www.bluegen.net

Change It Up – Foundation for Young Australians.
www.fya.org.au/initiatives/change-it-up

Involving teens in the community.
www.stepupfoundation.com/teens

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www.nbnco.com.au/getting-connected/service-providers/product-components.html

Kalbarri
National Park

Kalbarri

Murchison

Geelvink Channel

Horrocks

Yuna
Mullewa

utman
rolhos

Geraldton

Irwin

Mingenew

Dongara

Three Springs

IBM