




CITY *of* PERTH

# TOWARDS AN ENERGY RESILIENT CITY

.....  
Strategic  
Directions  
Paper

A photograph of a city skyline at sunset, framed by tree branches and a large tree trunk in the foreground. The sky is a mix of blue and orange, with the sun low on the horizon. The city buildings are silhouetted against the bright sky. A large tree trunk is on the right side, and branches with leaves are on the left and top. The text is overlaid on the left side of the image.

**“...THE CITY OF PERTH IS COMMITTED TO  
WORKING TOGETHER WITH THE COMMUNITY...  
TO CREATE A MORE ENERGY RESILIENT CITY WHICH  
WILL BENEFIT ALL OF US INTO THE FUTURE.”**





## Lord Mayor's FOREWORD

City of Perth is now set to take a lead role in planning for the future-proofing of the city against climate change and the impacts of increasing energy demand. The *Towards an Energy Resilient City* initiative sets out the strategic direction the City seeks to take, providing findings into the city's energy usage and proposed action plans to make positive changes.

With the initiative now firmly in place, the City of Perth is committed to working together with our key stakeholders, residents and businesses to create a more energy resilient city which will benefit all of us into the future.

Perth is a growing and vibrant city, well known as a great place to live and a destination for business investment.

The City of Perth is proud of the contribution that our state continues to make to the nation, and the innovation that is shown by all to deliver a positive and sustainable future.

We recognise that as our city grows, there are increased demands on the city's energy use. Now is the time for us to look at the opportunities to explore innovative and alternative methods for how energy can be delivered cost-effectively to meet our city's future energy needs and enable energy efficiency to be implemented across our buildings.

This initiative builds on the work already being undertaken by the City, which has supported the business community to deliver energy efficiency since 2008 through the CitySwitch Green Office Program. It also reflects our current initiatives with street light upgrades, improving City buildings, purchasing green power and emission off-setting.

By committing to reduce our energy consumption, be more sustainable and use renewable energy where possible, the City of Perth is now encouraging residents and businesses to also take their own action to lower greenhouse gas emissions.

### **Lisa-M. Scaffidi**

The Right Honourable the Lord Mayor

# CITY OF PERTH'S COMMITMENT TO CREATING A SUSTAINABLE CITY

**23 PROJECTS**

have received environment grants from the City of Perth since 2010/11

**10**

community education events

**5**

projects planting native and edible plants

**2**

projects promoting sustainable transport activities

**2**

business sustainability audits

**2**

installations of solar panels and an electric car charging station

**2**

organic waste recycling projects



**50% ENERGY**

to be saved from new lighting being installed in the Perth Exhibition and Convention Centre car park in 2014. From 2014/15, the City of Perth will commence a ten-year LED lighting upgrade plan on Council House

**32%**

target for city-wide emissions reduction

**20%**

amount of energy the City of Perth aims to reduce from its own operations between 2011-2021



**\$4,000,000**

approximate amount the City of Perth has spent on renewable energy, energy efficiency, and energy resilience-related projects and installations

**\$500,000**

invested into the City of Perth Cycle Plan 2029





2007: Commences the Vehicle Emission Offset program for CPP car park users reducing emissions by **64,200 TONNES** over the life of 380,000 trees

2007

2008: Launches the CitySwitch Green Office program facilitating the reduction of **17,100 TONNES** of carbon from Perth program participants



2008



2009: Signs the World Energy Cities Partnership  
2009: City-wide LED street lighting upgrade commences

2009

2010: Launches the Environment Grants and Sponsorship program which has committed **\$164,000** to initiatives such as solar electric vehicle charging stations



2010

2010: Develops the Elder Street green car park, to include electric car charging stations and solar panels



2011: Commences development of the Penny Lane Green Star affordable housing project (completed in 2013)

2011



2012: Launches the EcoHub Perth initiative which has received community pledges to save **1,212 TONNES** greenhouse gas emissions across the city

2012

2013: Council adopts the Strategic Community Plan Vision 2029



2013



2012: Council adopts the City of Perth Cycle Plan 2029

2014

2014: Sponsors a Building Upgrades workshop run by Norman, Disney and Young.



2014: Upgrades Council House air conditioning chillers, estimated to save 49% on chiller energy, equating to **129 TONNES** carbon every year



**Towards an Energy Resilient City is a strategic direction for the city as a whole, setting out the City of Perth's aspiration to future proof central Perth in the face of challenges from climate change and rising energy demand. This aspiration is fundamental to achieving the Perth community's 2029+ Vision of a city that is recognised globally as vibrant, accessible, affordable and sustainable.**

As Perth's urban form, climate and population change and evolve, the imperative to build resilience intensifies. The City of Perth recognises that business as usual activities in conjunction with these changes requires the consideration of future planning for energy security and affordability.

*Towards an Energy Resilient City* forms a foundation for the City's investment in working with key stakeholders to develop our relationships, partnerships and action plans in order to achieve an energy resilient future.







# OUR ENERGY RESILIENT FUTURE

# Defining energy resilience

Energy resilience is defined as the ability to withstand, or recover quickly from, fluctuations in the availability and affordability of energy. Transitioning towards energy resilience is a way to address climate change that can be achieved through reducing energy use, diversifying energy sources and using renewable energy.

## Climate change and energy resilience

As fossil fuels are used to generate energy, carbon (greenhouse gas) emissions are produced. These emissions are resulting in changes to the climate. Increasing risks associated with climate change are likely to impact infrastructure, water and energy supply, and cost of living. Internationally, governments and various agencies and organisations have been planning actions to address climate change and mitigate these impacts. Table 1 shows the potential impacts of climate change for Perth.

## Role of cities and the transition to a green economy

Green economies continue to grow across the world, generating new technologies to help cities sustainably manage their growth and reduce their greenhouse gas emissions.




Over two-thirds of Australians live in major cities,<sup>4</sup> making cities and urban environments significant contributors to greenhouse gas emissions, influenced by the ways that energy is used and managed. A city's relationship with this essential resource shapes its capacity for resilience.

Due to their high urban density, carbon emissions inherent in cities are typically lower per capita than national averages.<sup>5</sup> With high population and land use concentrations, cities have great potential to address climate change and build energy resilience. Cities experiencing rapid growth, such as Perth, offer opportunities to trial new technologies and innovation that significantly reduce greenhouse gas emissions.<sup>6</sup>

While the potential for Perth, as a rapidly growing city, presents a call to action, the challenge is to develop policies and cost effective practices that can deliver a low carbon, energy resilient and sustainable future. Cities need to leverage and realise tangible, achievable and lasting actions to reduce energy use and greenhouse gas emissions.



**Table 1: The potential impacts of climate change for Perth**

|   | <b>GLOBAL CHANGES <sup>1</sup></b>   | <b>PERTH LOCAL IMPACTS</b>  |
|---|--|---|
| <p><b>TEMPERATURE</b></p>      | <p>Without strong action temperatures are expected to rise between 2.6 – 4.8°C</p>   | <p>Increase in the number of hot days in Perth above 35°C from the current 28 days to up to 67 days by 2070 <sup>2</sup></p>  |
| <p><b>EXTREME EVENTS</b></p>   | <p>Climate change is expected to cause increased frequency and intensity of extreme precipitation, drought, storms and heatwaves</p> | <p>Impacts of climate related extremes eg. drought and heatwave include damage to infrastructure, disruption to water supply, increases in temperature-related deaths and consequences for mental health and wellbeing <sup>3</sup></p> |
| <p><b>DRYING CLIMATE</b></p>  | <p>Changes in rainfall are expected to vary around the globe, with many areas expected to experience significant changes</p>         | <p>The south-west of WA (including Perth) could expect a decrease in mean annual rainfall of 7% and reduction in surface water runoff by 14% in the period 2021 to 2050 relative to the period 1961 to 1990 <sup>3</sup></p>            |



# An Energy Resilience direction for Perth

This paper is the first in a series of dynamic documents and actions making up the *Towards an Energy Resilient City* direction for Perth. This direction has been developed for the city as a place, not for any one organisation, sector or level of government. It has been prepared by the City of Perth to complement existing programs and activities and to create new opportunities.

A key objective in developing this direction is to drive collaboration across the city to achieve a shared vision and roadmap towards an energy resilient and sustainable future. The solutions to energy resilience are not 'one size fits all' and require a suite of initiatives. It is important that realistic solutions are developed which can be practically implemented and work for a range of stakeholders.

Where appropriate and possible, the City of Perth will take on whatever role is necessary to mobilise action, whether through leading discussion, advocating initiatives or facilitating action. The City of Perth will also lead by example by committing to actions to reduce energy use and emissions within its internal operations and City-owned properties.

The development of this direction has involved research and analysis of energy use across the city. The City of Perth commissioned sustainability consultants Kinesis to undertake this research and identify strategies that could reduce emissions and deliver energy resilience across central Perth. The *Towards an Energy Resilient City* direction will use this research and analysis as a foundation to identify actions to achieve real cost effective emissions reductions.

Importantly, actions taken to reduce greenhouse gas emissions can contribute to broader local and state objectives to improve energy security and provide the infrastructure to future proof the city against rising infrastructure and energy demands.

**UNDERSTANDING ENERGY USE ACROSS THE  
CITY IS CRITICAL TO DEVELOPING STRATEGIES  
THAT ADDRESS THE SPECIFIC CLIMATE,  
LOCATION AND URBAN FORM OF THE CITY**

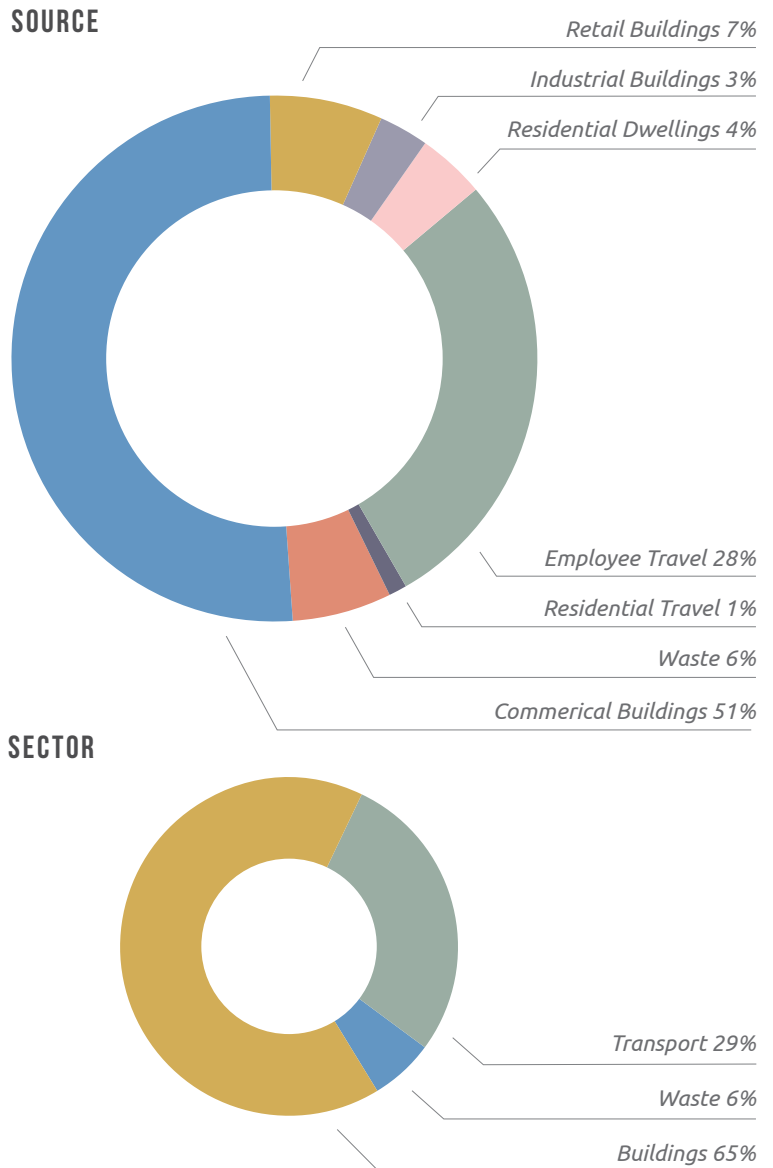


# Understanding how and where energy is used

The Perth community's energy and greenhouse gas emissions profile reflects its high density urban form which is dominated by the city's commercial centre. 51% of emissions are associated with commercial buildings, while only 4% are associated with residential dwellings (Figure 1). As a CBD, the majority of emissions from travel are associated with people commuting to Perth for work. Residents in the city have lower vehicle ownership and car use than the broader metropolitan area, with the average resident travelling 8.8 kilometres a day (compared to the Perth metropolitan average of 19.5 kilometres a day).

**Note:** Industrial buildings include manufacturing, storage/distribution and utilities/communication.  
**Source:** City of Perth C<sup>CAP</sup> City Spatial Analysis tool

Figure 1: Greenhouse gas emissions by sector + source 2006



# Understanding the changes across central Perth

The research and analysis undertaken has also helped to develop an understanding of the changing energy use profile of central Perth. The City has tracked and monitored changes in emissions, resource consumption and development across central Perth since 2006.

Between 2006 and 2011 results from this monitoring show:

- Residential dwellings have increased by 50% (3,643 dwellings)
- Residential electricity demand has increased by 39%
- Total electricity demand has increased by 8%
- Total gas demand has increased by 1%
- Total greenhouse gas emissions are estimated to have increased by 5%

Nationally, improvements in the performance of commercial building stock have resulted in slower emissions growth, however without intervention the city's greenhouse gas emissions will continue to grow as the city grows. The challenge is how to bring about greater improvements and work with energy infrastructure to address issues such as peak demand energy use.

## Action for an energy resilient future

The understanding of energy issues that the City of Perth has developed has been used to explore alternatives for the delivery of energy to the city. This work has identified four strategic directions that could deliver an energy resilient city, and the City of Perth is now engaging with key stakeholders on these strategic directions. The City is keen to collaborate with its stakeholders to develop feasibility studies which will identify opportunities for, and agree on a set of actions to deliver an energy resilient city.

**THE CITY OF PERTH AIMS TO REDUCE  
ITS OPERATIONAL GREENHOUSE GAS  
EMISSIONS BY 20% BY 2020**









7

Perth

45

PERTH

307

Transperth

Fremantle Swan Perth South West Leederville Shenton Park North Perth Scarborough East Perth Perth



## City of Perth's role

The City of Perth is leading the community in the move towards an energy resilient future through the development of an Energy Resilient City policy. The policy sets the direction by using the City's understanding of how and where energy is used, to collaborate with city stakeholders in the development of real actions which can be implemented to bring about an energy resilient future for Perth.

The City of Perth's commitment to a sustainable and resilient future is actioned through its Energy Resilient City policy. Inherent in the policy are key aspects of the City's role which include:

- Integrating energy resilience considerations into the City's business operations, including planning of all projects and future developments;
- Undertaking energy resilience engagement and education with the community;
- Facilitating programs, partnerships and collaborations to encourage energy resilience initiatives; and
- Committing to resource investment to ensure continual improvements towards energy resilience outcomes.

## Leading by example

The City of Perth recognises its role as a leader in the Perth community. The City of Perth aims to lead by example in the reduction of greenhouse gas emissions from its own operations and properties. The City has invested approximately \$4 million since 2007 in technologies which enable emissions reductions for its own operations and to facilitate city-wide reductions.

Actions taken to facilitate emissions reductions across the city have included the CitySwitch Green Office program (approximately 17,000 tonnes from 2008 to 2013) and offsetting emissions from commuter vehicles that utilise City of Perth car parks (approximately 64,200 tonnes expected during the life of the offset program).

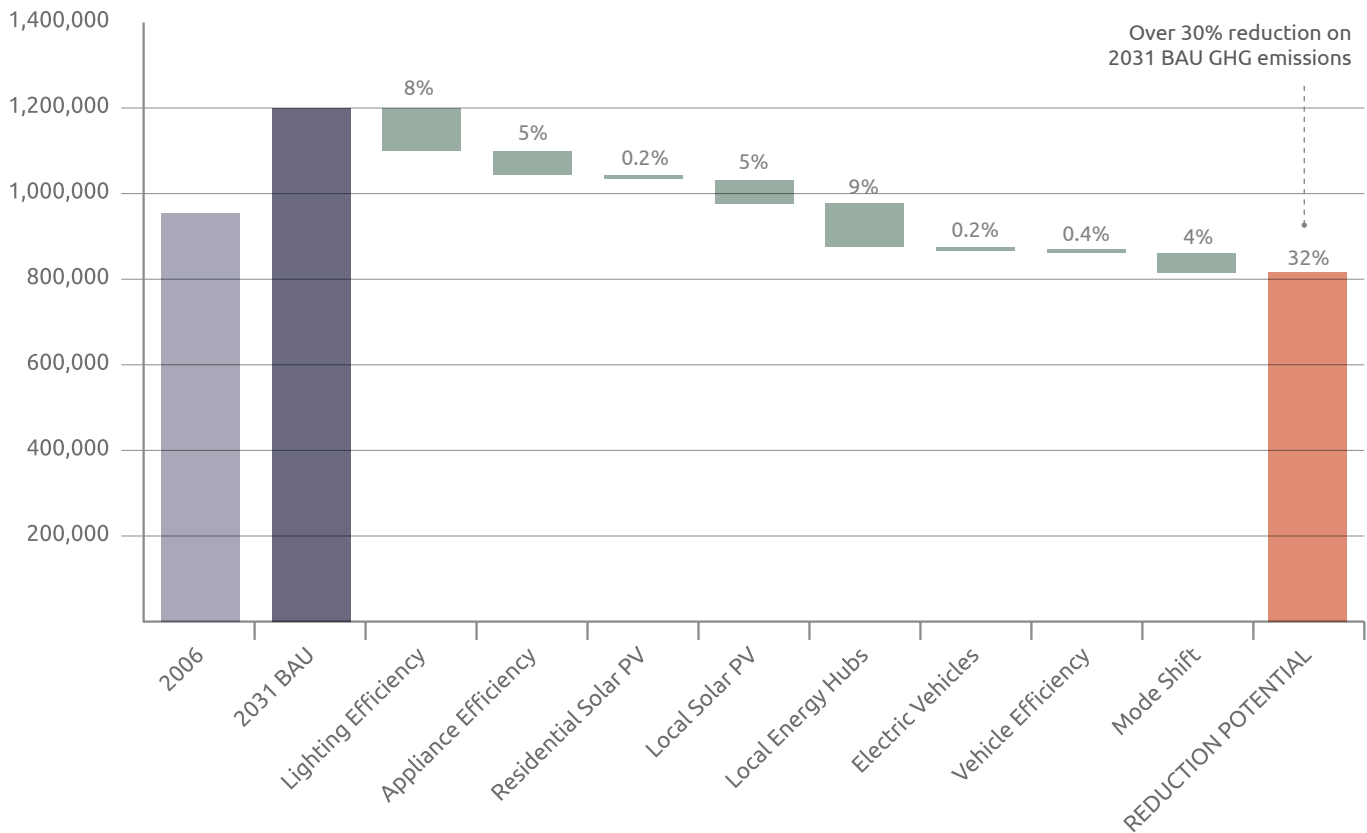
The City commissioned sustainability consultants Kinesis to develop a Corporate Energy Plan to audit the electricity and gas consumption of its own operations. A corporate energy management and action plan to drive energy, greenhouse gas emissions and cost savings across its asset portfolio is currently being developed. This work has helped the City of Perth identify priority areas for action to reduce its own corporate emissions and examples of its energy resilience actions to date are detailed in Figure 3.

Building on the innovations and technologies that the City of Perth has implemented into its own properties to date, the City aims to reduce its operational emissions by 20% by 2020 from a 2011/12 baseline.

# Aspirations for Perth

Through a suite of energy efficiency, low carbon and renewable energy measures, greenhouse gas emissions can be reduced across central Perth by 384,000 tonnes CO<sub>2</sub>e per year by 2031, or 32% compared to a business as usual development scenario. This is equivalent to the emissions generated by nearly 300,000 passenger cars each year.

**Figure 2: Emissions reduction potential for an Energy Resilient Perth**



**Note:** Percentage reduction is rounded to the nearest percent unless under 1%, in which case the reduction is reported to 1 decimal place.

**Source:** City of Perth C<sup>CAP</sup> City Analysis Tool



If managed carefully, the integration of demand management, low carbon and renewable energy across central Perth can reduce the city's greenhouse gas emissions and transition the city towards energy resilience.

Four strategic directions have been identified as a starting point from which actions can be developed to move the city towards an energy resilient future:

1

### ENERGY EFFICIENCY

can leverage the rapid evolution in lighting and HVAC technology across both residential and commercial uses, as well as financing mechanisms to enable building upgrades.

2

### RENEWABLE ENERGY

can provide a significant contribution to the city's future energy systems through community and local renewable energy generation, such as solar photovoltaic and encourage private and public investment.

3

### LOCAL ENERGY HUBS

could provide a mechanism to deliver smart and resilient infrastructure in energy dense locations around the city. For example, connecting energy infrastructure of adjacent buildings to deliver low carbon and locally generated energy, thereby lowering peak demand.

4

### TRANSPORT STRATEGIES

that encourage a shift away from private vehicles to public transport, more efficient vehicles, alternative car ownership options and the management of electricity demand and energy sources for electric vehicles can lower transport associated emissions.

**THE CITY OF PERTH'S  
AIM IS TO FACILITATE A  
32% REDUCTION IN CITY-  
WIDE GREENHOUSE GAS  
EMISSIONS BY 2031**





# The Challenge

The City of Perth acknowledges that the activities and aspirations suggested in this directions paper are ambitious and that undertaking these changes will require a collaborative effort. Working together with our stakeholders, we believe we can achieve a bold, bright and sustainable future for Perth. We recognise that leadership is required from individuals, from government, from the private sector and from the public sector.

Making changes to create a more sustainable city starts with a decision and the decisions we all make now will affect the kind of city that future generations will inherit.

The challenge we all face is to now find out what each and every one of us can do to be part of the solution in creating a more sustainable city in which to live, work, visit and enjoy.

## REFERENCES

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- <sup>2</sup> CSIRO (2007) *Climate Change in Australia Technical Report 2007*.
- <sup>3</sup> Department of the Environment (2014) *Climate Change Impacts in WA*.  
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- <sup>4</sup> Australian Bureau of Statistics (2006) *Population Distribution*. Australian Social Trends 2008 (4102)
- <sup>5</sup> Dodman, D. (2009) Blaming cities for climate change? An Analysis of urban greenhouse gas emissions inventories. *Environment and Urbanisation* 21 (9) 185-201
- <sup>6</sup> Dodman, D. (2009) Blaming cities for climate change? An Analysis of urban greenhouse gas emissions inventories. *Environment and Urbanisation* 21 (9) 185-201





CITY of PERTH

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