WSROC

Energy Consumption in Residential Buildings

Submission to the NSW Legislative Assembly Standing Committee on Public Works Inquiry into Energy Consumption in Residential Buildings

Western Sydney Regional Organisation of Councils Ltd

July 2003

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This submission has been prepared in response to the NSW Legislative Assembly Standing Committee on Public Works *Inquiry into Energy Consumption in Residential Buildings*. The WSROC Executive Management Committee at its meeting held on the 17th July 2003 resolved that:

> *In relation to the Inquiry into Energy Consumption in Residential Buildings that WSROC:*
>
> *1) Prepare a detailed submission to the NSW Legislative Assembly Standing Committee on Public Works Inquiry into energy consumption in residential buildings;*
>
> *2) the Environment Spokesperson and the Acting Executive Director be delegated authority to approve this submission; and*
>
> *3) the submission be tabled at the August 2003 Board meeting for information.*

WSROC's response is detailed under specific headings as outlined by the Inquiry's Terms of Reference. WSROC understands the Inquiry Terms of Reference to be as follows:

To examine:

1. Changes in annual energy consumption patterns of electricity, gas and solar;
2. Implications for capital works programs of energy providers of any increases or projected increases in energy consumption;
3. Factors contributing to any increase in energy use (such as, take up of appliances, such as air conditioners; current design practices; growth in size of houses; subdivision design); and
4. The application of current government and industry policies and initiatives (such as, the operation of rating tools, energy efficient appliances).

And to consider:

1. Strategies to address increasing energy consumption and to improve the sustainability of residential buildings, such as:
    - improving design, construction or operational practices for residential housing;
    - development of targets or other quantifiable outcomes for residential housing;

- product research;
- new technologies;
- retrofitting;
- consumer awareness and education; and
- any other strategies.

2. Implementation of such strategies; and

3. Any other related matter.

1.Introduction

Western Sydney is a complex urban area that has a dynamic mixture of developing residential zones. These include new greenfields areas in outer suburban areas, as well as increasing residential density of established areas (for example Bankstown, Holroyd, Parramatta and Castle Hill). Within the region, the demand for energy is growing rapidly with greenfield developments, increasing higher density redevelopment of residential zoned land and increasing reliance on energy consuming home appliances such as air-conditioning.

The issue of energy demand versus the capacity of the existing network to meet peak demands is a problem of particular relevance to Western Sydney. Western Sydney is one of the fastest growing regions in Australia. The 11 WSROC Councils plus Camden and Campbelltown have a population of nearly 1.7 million people. This is projected to grow to 2.2 Million by 2019. This population growth of 30% in the next 18 years is at a rate faster than the 26% predicted for the whole of the Sydney Statistical Division and is more than 1.5 times the predicted New South Wales average of 19%.

In order to move Western Sydney toward a 'Triple E' rating of Energy Efficiency Excellence, WSROC considers it essential to achieve the following:

1. Investigate, promote and implement strategies for improving service and supply to existing residential developments and their associated infrastructure, either as retrofit or as augmentation of the existing network, as well as to meet the demand of newly developing areas.

2. Support such strategies by improving the availability and marketing of energy efficient appliances, energy efficient building materials, and energy efficient housing design.

3. Gain the support from the housing, building and development industries, which will greatly assist better planning for energy efficiency.

4. Establishing affordable energy efficient alternatives to assist their uptake, with the cost at least equitable with current energy sources to provide a broader consumer base with which to promote sustainable energy alternatives in Western Sydney.

5. The development of a framework to encourage the uptake of alternative, environmentally neutral and efficient renewable energy sources in Western Sydney. This will contribute to efficient use of energy, improve the regional economy and employment, will have less environmental impact, and will position the region for the future.

6. WSROC suggests adoption, resourcing and implementation of the *Draft Western Sydney Sustainable Energy Plan* developed by the Sustainable Energy Development Authority as a suitable vehicle for achieving these goals.

This submission seeks to clarify WSROC's view on the state of residential energy supply and demand in relation to existing urban infrastructure. This submission also briefly addresses broader issues relating to regional planning, industry support, institutional constraints, cost and maintenance, and synergies in Western Sydney.

For the purposes of discussion, Integral Energy is referred to as the energy supplier that covers most of Western Sydney.[1] Appended are some examples of energy efficient programs from elsewhere.

[1] Auburn Council and most of Bankstown Council are serviced by Energy Australia. All other WSROC councils and parts of Bankstown are serviced by Integral Energy.

2.Changes in Annual Energy Consumption Patterns of Electricity, Gas and Solar

The context within which residential energy consumption operates in Western Sydney is important. The majority of stationary energy demand in Western Sydney is supplied by electricity (72%) and gas (20%). Because electricity is generated by distant power stations and transported to Western Sydney through the high voltage network before conversion to low voltage electricity for end-use, significant losses (up to 13%) can occur, depending on the type of energy and distances involved. Therefore, there is a net deficit in terms of potential energy available, and actual energy supplied.

There are a number of smaller generators located in Western Sydney, including waste coalmine gas, several cogeneration plants and some renewable energy. However, renewable or sustainable energy sources within Western Sydney are minimally represented (less than 0.3%). Electricity generation capacity located in Western Sydney is approximately 345 Megawatts, representing less than 3% of total state generating capacity. By contrast, Western Sydney is home to more than a third of NSW's population and 25 % of state manufacturing activity.[2]

Integral Energy, the principal supplier for Western Sydney, estimates that over the next 10 years demand on its network will increase by 32% and customer numbers by 24%. Integral Energy acknowledges that it is operating an aging network with decreasing performance capability. At the same time, more than 50% of homes in Western Sydney now have installed air conditioning.[3] Much of the load placed on energy supply networks is derived from periods when there is large-scale simultaneous residential demand for electricity, such as use of air conditioners on hot days. This load appears to be increasingly driven by lifestyle choices, particularly the use of air conditioning, but is also related to the availability and choice of housing design.

Peak energy demand has significantly increased in Western Sydney, and the load this adds to the network is not sustainable with current projections on demand. Air conditioning is increasingly affordable and desirable, many with systems that can be set to run remotely. In the early 1990s about 25% of houses had installed air conditioning. In Western Sydney, this figure is now over 50% of households. As such, air conditioning is placing a huge strain on the electricity network during summer months. In its latest network assessment, Integral Energy notes that, in some areas, average household energy consumption has doubled.

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[2] Sustainable Energy Development Authority (2002) *Draft Western Sydney Sustainable Energy Plan*
[3] Integral Energy (2003) *Network 2013: Annual Planning Statement 2003*

The nature and timing of peak energy demand is also changing. There has been a significant shift from a winter peaking pattern to a summer peaking pattern, due largely to increased air conditioning use in both the residential and commercial sectors. The shift to a summer peaking pattern creates most demand on the network at the very time when the network is least able to transport power due to thermal limits. Power lines stretch and sag in hot weather, reducing the amount of power they can carry. In addition, the network has developed over time to cope with a winter peaking pattern.

As had been outlined, energy use varies greatly over time, both daily and seasonally. However, there is significant diversity that is masked within these patterns. For example, a large house with a heated pool and ducted air-conditioning is far more energy intensive than a modest unit. Various behavioural factors of residents also come into consideration here. There appears to be relatively little uptake of energy alternatives, such as solar hot water heating. It is unclear whether this is due to low consumer awareness of alternatives, market issues, sources and supply, or perceptions of risk and usefulness to current lifestyles.

A change toward a more sustainable and reduced energy use must be encouraged through a suite of financial and policy mechanisms. There appears to be little inclination within industry to shift towards renewable energy sources or to provide for end-use energy efficiency of products and services. To catalyse such a shift will require strong policy direction from government at all levels. Local Government has little power to force such a shift. For example, while several WSROC Councils have adopted an Energy Smart Homes policy or DCP, this affects only a small part of energy consumption patterns. Standards set in DCPs may only require a minimum rating in terms of energy efficiency, and in no way influence consumer behaviour, choices or availability of products and services.

3.Implications for Capital Works Programs of Energy Providers of Any Increases or Projected Increases in Energy Consumption

Western Sydney is a rapidly growing market for energy providers. It is a region that is consuming resources to meet the demands of rapid population growth and to fuel industrial, commercial and employment opportunities.

Significant capital investment will be required to augment the energy network in response to growing demand. Inevitably, costs will flow on to consumers and the economy. Therefore, there is an inherent benefit in providing consumers with practical, cost-effective, energy efficient alternatives and options. This is particularly relevant in Western Sydney where there are significant clusters of population with a socio-economic disadvantage interspersed with areas of relative affluence. The average Western Sydney household spends around $920 a year on domestic fuel and power, compared with a Sydney metropolitan average of $880[4]. Yet, average weekly household income is $84 lower in Western Sydney than NSW as a whole. Therefore, the proportion of household income spent on domestic fuel and power in Western Sydney is between 14% and 44% greater than NSW averages.

Integral Energy estimates that, over the next ten years, $1.6 billion will be required to meet growing energy demand. Network augmentation on this scale is likely to increase the cost of meeting demand for energy services (particularly peak energy services).[5] This will have significant flow on costs for consumers.

Most of Western Sydney's energy demand is supplied from non-renewable energy sources located at a considerable distance from the region. There are significant losses in energy during transportation and conversion for domestic consumption. Available energy, or net energy delivered to consumers, is significantly less than total energy. To mitigate loss of energy during transport, an option that could be considered would be the development of embedded energy networks with local nodes of energy supply. This would also enhance the security of energy services by decentralising sources of supply. However, this also requires significant capital investment, and would require detailed cost-benefit as well as socio-economic impact study.

Reliability of supply has become a significant concern in recent years, and has been recently highlighted in the media. Western Sydney is subject to a growing risk of summer blackouts deriving from the increased use of air conditioning in the commercial and residential sectors. Commercial and residential sectors are considered especially energy intensive. This is due to

[4] Australian Bureau of Statistics (2001) *Regional statistics, New South Wales* 1362.1

a combination of factors including " … *growth of refrigeration load in supermarkets, longer shopping and office hours, and higher standards of comfort conditioning and lighting*."[6]

The electricity distribution industry for the bulk of Greater Western Sydney, Integral Energy, is facing increasing difficulty in responding to the rapid growth in demand on energy supply. At summer peak times, the load factor disproportionately increases and may exceed what the network can deliver. Because of the essentially centralised nature of electricity supply nodes in Western Sydney, the network is vulnerable to excess demand, and breaches of network integrity, such as in extreme natural events or, potentially, malicious intent. Recent examples include the power interruptions experienced in Sydney during fires in December 2002 and storms in January 2003. Finally, there is a significant difference between total energy available, and final energy delivered. This reflects losses in energy conversion, mostly in electricity. This loss averages approximately one third across all sectors, but may be as much as two thirds in some instances.

Growing energy demand has significant environmental as well as economic implications. An increasing body of evidence suggests that greenhouse gas emissions are contributing to global warming and climate change. Long-term changes to regional climate systems include changing rainfall patterns and more frequent extreme weather events. These changes will have significant economic and environmental implications in terms of patterns of residential energy use and consumption, and therefore on the networks of energy supply.

The development of sustainable energy options – including cleaner supply and greater energy efficiency - can mitigate or avoid many or all of these impacts.

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[5] Integral Energy (2003) *Network 2013: Annual Planning Statement 2003*
[6] Greene & Pears (2003) *Policy Options for an Energy Efficient Australia*

4.Factors Contributing To Any Increase in Energy Use

WSROC's view is that the primary issue driving increasing energy demand is regional population growth combined with changing lifestyle values. As stated previously, the Western Sydney region is one of the fastest growing areas in Australia, with a current population of nearly 1.7 million people projected to grow to 2.2 Million by 2019. This increase of in the order of 500,000 people (or 220 000 – 250 000 households) will be exacerbated by the trend in shrinking household size. The actual number of dwellings is expected to grow, in percentage terms, even faster than the rate of population increase. More than 200,000 additional dwellings will be required by 2019. An increase in population and dwellings carries with it the requirement for a corresponding expansion of infrastructure. With over 70% of the domestic demand for energy in Western Sydney being met by electricity and an aging electricity asset base, the implications for electricity demand from the projected increase in population and dwelling numbers are significant.

Western Sydney is significantly warmer than coastal suburbs of Sydney, and therefore the orientation of houses in subdivisions contributes to energy demand. Houses that have an east-west orientation are subject to the full effect of thermal heating experienced in summer. Some types of suburban developments may also act as a 'heat trap' in summer. Such examples would include high-density residential areas with clusters of unit blocks (for example Liverpool, Bankstown, Parramatta, Castle Hill); as well as newer greenfields developments where houses are built almost to the edge of the block (Quakers Hill, Rouse Hill).

Exacerbating the issues outlined above are factors relating to housing size and design. In greenfields developments along the urban fringe, the trend is toward larger houses on smaller blocks of land. Many house designs exhibit characteristics such as large atriums, rooms, and open plan living. Such designs lend themselves to heating and cooling problems, even with the installation of insulation. Western Sydney characteristically has more extreme seasonal temperature variations than coastal suburbs, so people turn to air conditioners as an option. Heating and cooling of large internal spaces is more energy intensive than a dwelling where parts of the building can be closed off.

A significant proportion of houses on the market are designed with no eaves. The presence of eaves contributes to shading and therefore cooling effectiveness in hot weather. Choice of building material also affects heating and cooling of residential dwellings. For example, use of denser building materials, appropriate insulation or double glazed windows. Poor building techniques and the 'Home Village' market encourages cost-cutting and the use of cheaper materials, limiting the effect any energy efficient measures that may be applied. For example,

while many new homes in Western Sydney have a 3.5 star rating, poor design, incorrect orientation, and lack of curtains encourages the use of air conditioners.

Changing lifestyles and expectations of comfort also contribute to the demand on energy. Apart from air-conditioners, there is an increasing presence of electronically driven appliances in the home, such as computers and home entertainment systems. For example, some research indicates that electronic appliances on standby power consumption may account for over 11% of household electricity consumption and about 10% household greenhouse gas emissions.[7] Hot water heating is the largest single component of household stationary energy demand and is responsible for between 25-40% of stationary energy use.[8]

While gas makes up about 20% of the domestic energy supply (cooking and heating), lifestyles are increasingly dominated by the silicon chip, electronic forms of entertainment, air-conditioning and other electrical appliances. Electricity remains secure as the energy source of choice.

End-use energy efficiency is not a major factor for consideration by consumers, suppliers, manufacturers and policy makers. In recent years, ample supplies of electricity combined with competitive markets and reducing energy prices has created expectations within the community of cheap, available energy supply. Hence, there has been no pressure exerted to seek energy efficient alternatives.

There is only limited availability on the market of competitively priced alternatives, such as solar power. While there are government rebates available, the up-front costs are higher than traditional systems. This is a particularly critical issue as it acts as a disincentive in a variety of ways. When people are considering building or purchasing a home, the initial up-front cost is what comes into consideration, not potential savings in the future. This is because the choice is made on resources available now, and this acts as a limiting factor. Lack of cost-effective alternatives also means that low-income families are likely to buy second hand goods rather than new, energy rated appliances. Capital outlay on alternatives such as solar power, or even replacing windows with energy rated glass is also not possible in rental or housing commission property.

There is a growing body of evidence suggesting that greenhouse gas emissions are contributing to climate change because of human activity. The effect of climate change is a very real long-term problem, but the environmental effect of energy consumption is not

[7] Harrington and Kleverlaan (2001), in: Greene and Pears (2003) *Policy Options for an Energy Efficient Australia,* Australian CRC for Renewable Energy
[8] SEDA (2002) *Draft Western Sydney Sustainable Energy Plan*

readily visible, nor is it sufficiently high in public consciousness. There appears to be little understanding within the general community of the link between energy use and greenhouse gas emissions. This means that the willingness to make choices that affect energy efficiency is diluted. This awareness is improving, and is likely to exert pressure on energy suppliers and government in the future. The potential for energy efficiency in Western Sydney in terms of further reducing greenhouse gas emissions is significant. For example, the WSROC Councils participating in SEDA's Energy Efficient Homes Program can realise potential CO^2 gas reductions of nearly 22,500 tonnes / year.

5.The Application of Current Government and Industry Policies and Initiatives

WSROC strongly advocates a significant policy shift to aim for a higher Mandatory Renewable Energy Target (MRET). For example, some European countries have adopted a MRET of 10%, while Australia's is currently set at 2%. The lack of industry regulation and failure of Government at all levels to ensure stringent design, building and product codes has, to date, been insufficient to create a market for change.

WSROC also strongly supports the finalisation and application of SEDA's *Draft Western Sydney Sustainable Energy Plan*. This plan provides a suitable framework with which Western Sydney can start dealing with issues of energy efficiency.

Many studies of energy efficiency appear to focus on overarching frameworks and organisations responsible for developing policy. However, residential energy efficiency depends to a large degree on the willingness and ability of energy consumers to make choices that will lead to energy efficient outcomes. There are a significant number of programs that could contribute to residential energy efficiency such as: Energy Smart Homes, Energy Smart Hot Water, Energy Smart Developers, Appliance Energy Ratings, Live Energy Smart and Green Power. Yet, apart from Appliance Energy Ratings there appears to be little consumer awareness or market penetration of these initiatives. There appears to be a divergence of existing institutional arrangements and policies, and the factors that influence consumer behaviour.

There is currently little incentive for industry (housing, home appliances) products to compete on an energy efficiency basis. It is apparent that customer choices are largely influenced by factors other than energy efficiency, such as fashion, range of products, type of home building materials typically marketed, availability of products, knowledge of alternatives, and cost. It is at the individual level that choices will be made whether or not to buy a certain product, or use it in a certain way, and to save energy. Consumer choice will be influenced by their knowledge of, availability of, access to, and cost-effectiveness of alternative products. Such choices are likely to be most influenced by how much it will cost up-front and by some others, how much it will save them in bills.

A shift in industry to provide energy efficient goods and services will assist in changing or influencing consumer behaviour. However, this can be misleading in terms of residential energy consumption. The demand for residential and lifestyle appliances adds to energy demand. For example, the greenhouse gas emissions produced for the whole lifecycle of an appliance from material production to disposal would show that significant energy

investment is required for its production. For example, one study of a washing machine indicated that while the bulk of greenhouse gas emissions occurred during operation of the appliance (about 70%), the manufacture of detergent and packaging was a significant secondary contributor of greenhouse gas emissions (about 25%).

6.Strategies to Address Increasing Energy Consumption and To Improve the Sustainability of Residential Buildings

This is a very complex issue because there are many competing factors influencing household energy use. Some of the key determinants of household energy use would include:

- local / regional climate;
- type of dwelling;
- age and type of construction;
- size of dwelling;
- household size; and
- household income.

The characteristics of Western Sydney provide strong potential to curb growing energy demand through increased energy efficiency, by increasing the supply of energy from more sustainable sources and from local generation capacity. Such an approach could create significant economic, social and environmental benefits. These include:

- saving money for households through greater energy efficiency;
- supporting efforts to augment the network;
- diversified local energy sources with improved security of supply;
- creation of jobs in the sustainable energy industry and generation of regional income;
- reduction in emissions of greenhouse gases and other pollutants, with subsequent improvement of air quality, amenity and health; and
- encouraging more efficient use of water and other resources.

6.1 Improving design, construction or operational practices for residential housing

WSROC recommends that, as far as is practicable, new housing precincts should be designed with houses having a north-south orientation. This use of passive design elements maximises advantages of summer and winter light and heat intensity. Maximum energy efficiency should be used as one of the guiding principles for all new developments.

Houses and units should be designed to maximise energy efficiency. This includes simple design elements such as eaves, natural ventilation, airtight windows and doors, hot water systems as close as possible to kitchens and bathrooms, solar hot water systems, separate hot and cold taps[9], and the placement of rooms within the house.

In some instances, simple household practices can make a significant difference on all but the warmest of days. An example would be drawing curtains in the morning before leaving for work, an option that can have a significant cooling effect on internal household temperature.

Houses and units should be designed to with energy efficient materials and construction. Dense construction materials for the Sydney[10] climate cool air in summer by absorbing heat and heat the air in summer by releasing stored warmth. Dwellings benefit from the maximum use of insulation, within the ceiling, walls and if possible, the floor. Appropriate use of insulation will significantly reduce heating and cooling bills. Much heat gain and loss is through windows. Glass type (double glazing or filtered glass), frame construction, type of window and its air tightness have a critical effect on the performance of a home. Appropriate selection of the type of window, such as double-glazing, can make a significant difference to the household's heating and cooling bills. While there are mechanisms to assist the consumer in making these choices (such as the Windows Energy Rating Scheme) it is unclear how much this influences, or is even considered, in purchase decisions

WSROC suggests that a critical question which needs to be addressed is: to what extent can the supply side market participants be required, or need practical incentives to deliver energy efficient solutions? Many of the suggestions outlined above depend on the availability and supply of products, consumer and industry knowledge of products, skilled builders, cost of products, and marketing of products.

In addition, investigation of approaches to reduce demand and improve energy efficiency of commercial and retail buildings must be considered as a key area with regulatory development control frameworks as well as issues of co-location of energy sources (i.e. solar panels).

6.2 Development of targets or other quantifiable outcomes for residential housing

WSROC notes that the development of a regional energy consumption data set is of primary importance for measuring actions taken to improve energy efficiency and manage supply and

[9] Mixing taps draw off hot water, much of which is wasted because it cools in the pipe.

demand. Such an energy consumption dataset will need to be linked back to availability, market penetration and use of energy efficient appliances, design principles and consumer behaviour. The development of such a dataset is a key objective of SEDA's *Western Sydney Sustainable Energy Plan*.

WSROC notes that whilst regional and state benchmarks and targets are necessary to meet NSW's state, national and international obligations, the site of demand for energy is at the local or household level. It is at this basic consumer level that the success or otherwise of any policy or strategy will be reflected.

WSROC recommends benchmarking against what is possible, rather than against current best practice. The challenge is to identify what is the best possible practice, and identify the strategies required to close the gap between current best practice and what is possible.

6.3 Product research

WSROC suggests that substantial support from the manufacturing, retail, housing, building and development industries will greatly assist the process of developing a greater availability and awareness of energy efficient products and design principles. Raising consumer awareness of the potential opportunities through effective marketing is an essential precursor (for example, the energy rating scheme for refrigerators). As noted above, WSROC recommends that product research and development should benchmark against what is possible, rather than against current best practice.

There are potential opportunities and synergies here for the manufacturing and retail sectors. For example, an AAA rated showerhead saves water as well as reducing the energy needed to heat water. Wastewater re-use and use of rainwater can also offset the cost and energy required to use potable water. As water scarcity becomes an issue of growing importance, the synergies between greater energy and water efficiency are increasingly valuable.

6.4 New technologies

WSROC suggests that there is a significant opportunity to promote more sustainable energy options now, because significant new generation capacity is required to meet future energy demand. Investment decisions made now will have long lived impacts on consumers and energy assets such as power stations. It is essential for the future of the region to ensure that decisions taken now facilitate the transition to a sustainable energy future, and not make it more difficult or costly.

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[10] Lightweight materials may be more appropriate in sub-tropical and tropical climates.

WSROC further suggests that the question is not so much one of new technologies, but maximising the opportunities presented by existing alternative technologies. This is not to suggest that research should not be continued into new and potentially useful technologies, but that there is a sufficient range of energy efficient alternatives available now that can be potentially applied.

Renewable energy systems such as photovoltaic panels (solar), wind turbines (wind) and micro-hydro generators (water) are examples. Photovoltaic panels are perhaps the most practical alternative available at present for Western Sydney. One of the simplest applications of photovoltaic cells is a solar hot water panel, which would offset the significant cost of water heating for households. Western Sydney is ideally situated for the large-scale application of such an option.

6.5 Retrofitting

Retrofitting or renovation can achieve significant gains in energy efficiency for most existing dwellings. These could involve all of the options (and others) noted in 6.1 above. The question is whether consumers are prepared to, or indeed are able to, invest in options for energy efficiency. As mentioned previously this depends on awareness, availability, and affordability.

WSROC advocates that options for a subsidised retrofit program should be investigated. This is applicable not only to many areas of Western Sydney, but other areas of regional NSW. Other considerations that may provide constraints with retrofitting or renovation include:

- Adaptability of design for the type of existing building;
- Surrounding built environment;
- Council permission for modifications due to heritage, waste removal or other issues;
- Availability and cost of options and materials;
- Limited options for tenants and housing commission occupants; and
- Permission from the body corporate in multi-townhouse or unit complexes.

6.6 Consumer awareness and education

Because Western Sydney is climatically more extreme than coastal Sydney, the region is more likely to use heating and cooling devices, adding to the peak demand for energy. WSROC views this as an opportunity to actively promote sustainable energy incentives

which are likely be more effective in Western Sydney than other parts of the city. However, WSROC reiterates the point that the lower income per head population is an important factor in determining the type of incentives as many existing alternatives are more capital intensive in terms of initial outlay.

Many consumers would like to do something to help the environment, but the immediate financial cost of doing so is the bottom line on which individual and household choices are made. In order to assist people with that choice the cost of alternatives must be at least equitable with current energy supply. This will provide a broader consumer base with which to promote sustainable energy alternatives. This is particularly relevant for Western Sydney, which remains a region with significant clusters of economically disadvantaged people interspersed with suburbs of relative affluence. For example, mainstreaming the cost of Green Power schemes would assist its uptake.

There is a considerable range of programs available to assist people with making energy efficient choices in terms of construction, design, appliances and lifestyle. However, there appears to be little overall awareness of these programs within the community. There is a large range of energy efficient products potentially available, yet, there appears to be little uptake of such products. Most of the lifestyle appliances available (air conditioning, home entertainment, computers) are not energy efficient when used. There appears to be a need for a concerted and effective two-fold approach of making consumers aware of the choices and options available to them now; followed in the longer term by development of a market for energy efficient goods and services.

6.7 Any other strategies

WSROC suggests consideration be given to maintenance and retention of energy efficient appliances and systems over time, particularly in residential dwellings. Poorly maintained appliances will have reduced effectiveness or no effect at all, offsetting the benefits that were intended. Retention of appliances and systems over time is another potential issue, as renovations take place, or as new householders elect to choose an alternative.

7.Implementation of Strategies Address Increasing Energy Consumption and To Improve the Sustainability of Residential Buildings

WSROC suggests that options outlined by Greene and Pears in their 2003 paper *Policy Options for an Energy Efficient Australia* are explicitly applicable to the situation in Western Sydney. These are:

1. Establish short, medium and long term targets for energy activity using measurable and meaningful indicators;

2. Publish contingency measures and develop supportive infrastructure that can be implemented quickly if action falls short of short-term targets;

3. Develop long-term scenarios for sustainable energy uptake that can guide economic and social development;

4. Strong measures will be required to support gradual transition to sustainable energy scenarios; and

5. Scope for implementation of low cost, energy efficient improvement that will enhance economic, social and environmental performance is high.

These would be effectively supported by the implementation of the *Draft Western Sydney Sustainable Energy Plan* as an important first step to putting in place better mechanisms to manage regional growth and to ensure sustainable energy supply and use. Existing mechanisms are not delivering the infrastructure, environment and outcomes needed by Western Sydney in the face of substantial population and urban growth.

Additionally, WSROC suggests that any approach to improving residential energy use should:

- investigate, promote and implement strategies for improving service and supply to existing developments and their associated infrastructure, either as retrofit or as augmentation of the existing network;

- acknowledge that substantial support from the housing, building and development industries will greatly assist better planning for energy efficiency;

- support strategies to improve the availability and marketing of energy efficient appliances, energy efficient building materials, and energy efficient housing design;

- acknowledge that cost-effective and subsidised energy efficient alternatives will assist their uptake, and the cost at least equitable with current energy sources to provide a broader consumer base with which to promote sustainable energy alternatives in Western Sydney;
- consider a suitable regional approach to promote the sustainable energy sector with Local Government in Western Sydney; and
- consider the longer-term development of a framework to encourage and maintain the uptake of alternative, environmentally neutral and efficient renewable energy sources in Western Sydney.

This will contribute to efficient use of energy, improve the regional economy and employment, will have less environmental impact, and will position the region for the future.

8.Other Related Matters

WSROC notes that figures for household energy consumption can be somewhat misleading, and therefore care needs to be taken when designing programs that target appropriate areas of activity. The demand for household goods and services have an indirect but significant effect on energy at the supply end. Any approach to improving residential energy efficiency should consider potential gains to be made from commercial and industry sectors also. For example, even though transport and manufacturing represent a large proportion of total energy use, both these sectors are influenced by the demand for goods and services by households. The individual household has little control or influence over the energy emissions of services and products used. The question becomes one of how to prioritise energy use activities in order to direct policy and incentives where it can be most effective.

WSROC notes that there are also synergies to be gained from investigating approaches to water and waste efficiency, and how these can influence energy consumption as well. Measures to promote sustainable energy can deliver regional co-benefits, such as improved air quality and amenity, more efficient use of water and other resources.

WSROC notes that a broader issue is energy supply and a sustainable energy network. A sustainable energy network should be resilient, have the capacity supply peak demands, and have the capacity to absorb the impact of extreme natural events such as storm damage or bushfires. Recent examples include the power interruptions experienced in Sydney during fires in December 2002, and storms in January 2003. Investigating options for an embedded energy network is one way to address these issues, and is a key part of the transition to a more sustainable energy system. This would mean that it is less likely that the loss of a power station unit or transmission line will affect a wide region. A more diverse energy system is a more secure energy system.

WSROC suggests that a unified state strategy to address energy consumption in residential buildings (similar to Resource NSW Waste Avoidance and Recovery Strategy) is essential to provide a broad framework within which to achieve energy sustainability.

9. Further Information

For further information regarding the information in this report please contact WSROC's Senior Project Officer (Environment) on 9671 4333.

APPENDIX 1: EXAMPLES OF ENERGY EFFICIENCY STRATEGIES APPLIED ELSEWHERE

- The *Sacramento Municipal Utility District* (USA) established a $59 million energy efficiency program to offset the need to purchase additional electrical power capacity. The program resulted in $45 million avoided purchasing of power from other regions, an increase in regional income of $124 million, the creation of about 880 direct-effect jobs, and $22 million added to the area's wage-earning households. Additional long-term benefits accrue to the region through lowered overhead or operating costs for participants.

- *Osage Municipal Utilities* (USA) has spent $350,000 on energy conservation, yielding a saving of more than $1 million per year on energy bills. The principal beneficiary has been the town's economy. Unemployment is half the national average. While most of the USA's rural and small-town economies have been struggling, firms are moving to Osage.

- In *San Jose, California* (USA), an initial $654,350 investment in energy efficiency measures stimulated a further $8.5 million from the private sector. This has generated an estimated $33 million in incremental wages and salaries, new employment of 1753 job/years, and an increase in local spending of $20.8 million. The initial energy savings are estimated to be $4.3 million.

- The use of renewable energy in *Wisconsin* (USA) generates about three times more jobs, earnings, and sales output in Wisconsin than the same level of imported fossil fuel use and investment. A 75% increase in the state's renewable energy use would realise more than 62,000 new jobs, $1.2 billion in new wages, and $4.6 billion in new sales for Wisconsin businesses.

- In *Saarbrücken*, (Germany) low interest loans subsidised by the local utility are offered to consumers for household energy or water efficiency improvements. Loans are provided by a local partner saving bank, and have resulted in the reduction of carbon dioxide emissions by 60% over the past 10 years. The goal is to eliminate the region's dependence on fossil fuel.

- In 1990, the city of *Leicester* (UK) announced its commitment to reduce energy use in municipal buildings by 50 percent by the year 2025. The City reinvests half of all identified energy savings in efficiency projects. The rest is returned to building managers to be spent on facility improvement. Most measures implemented generate an internal rate of return of 25%. Leicester's energy budget, totalling some £3 million, has been cut by 2-5 percent per year, thus leveraging some £60,000-£150,000 per year.

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