

# Energy Efficiency and its limits-why conservation must be part of the equation

## *A response to Energy Efficiency-Productivity Commission Draft Report<sup>1</sup>*

The draft report<sup>2</sup> is a laudable effort by the Australian Productivity Commission. As Figure 1 show, Australia's energy footprint is somewhat high compared to high-income countries, and very high compared to medium- and low-income countries. Australia's energy efficiency is slightly worse than the world average and somewhat worse than the world median (see Figure 2). Given about 84.5% of people live in middle- or low-income countries<sup>3</sup>, and Australia is a high-income country, there is room for improvement.

### *Energy Efficiency and the Rebound Effect*

While energy efficiency is useful in reducing energy consumption over the short term, the Productivity Commission does not fully appreciate the rebound effect. The rebound effect is where energy savings due to efficiency is eaten up by greater consumption-as energy is cheaper, people can afford to consume more<sup>4,5</sup>. Figure 2 shows that energy consumption is much higher in high-income countries than middle- and low-income countries. The same pattern is seen in Figure 3. For both Energy and Ecological Footprints, the more money people have, the more they consume.

Herring<sup>6</sup> argued that:

“Despite many campaigns to reduce energy use over the last 25 years, national energy consumption in all of the world's industrial countries has continued to rise, not fall.”

An example from Herring<sup>7</sup> is light bulbs. In the early 1900s, tungsten light bulbs replaced those with carbon filaments. The new bulbs consume only ¼ to ½ to that of carbon bulbs. More recently, the compact fluorescent bulb which uses ¼ of the energy of tungsten bulbs came into use. The result is a massive increase in consumption. Verbruggen<sup>8</sup> found that high final electricity prices are needed for overall and persistent energy efficiency.

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<sup>1</sup> Productivity Commission (2005) *Energy Efficiency*, Draft Report, Melbourne (hereafter Productivity Commission (2005))

<sup>2</sup> *ibid*

<sup>3</sup> World Wide Fund for Nature (2004) *Living Planet Report 2004*. Gland, Switzerland (hereafter WWF (2004))

<sup>4</sup> Herring, H. (2006) Energy efficiency-a critical view. *Energy* 31: 10-20

<sup>5</sup> Productivity Commission (2005) *supra* 1

<sup>6</sup> Herring (2006) *supra* 4

<sup>7</sup> *ibid*

<sup>8</sup> Verbruggen, A. (2003) Stalemate in energy markets: supply extension versus demand reduction. *Energy Policy* 31(14): 1431-1440

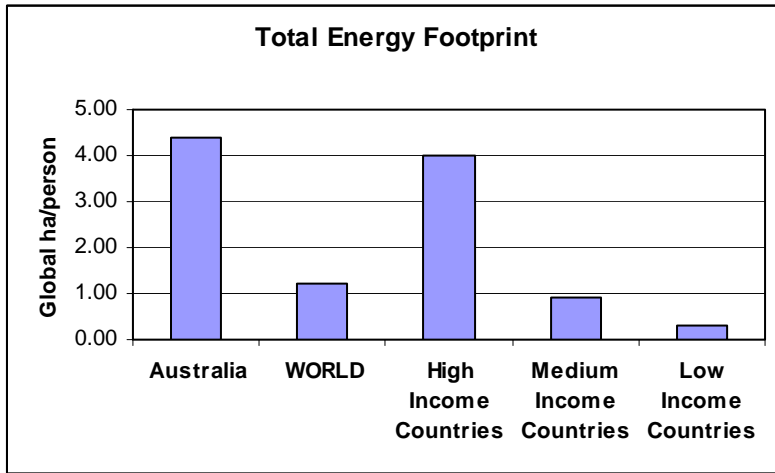


Figure 1. Total Energy Footprint. Source: WWF (2004)<sup>9</sup>

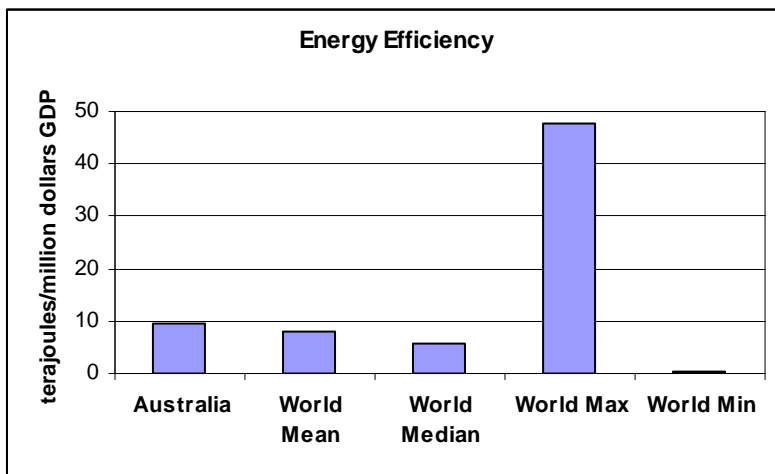


Figure 2. Energy Efficiency. Source: Esty *et al.* (2005)<sup>10</sup>

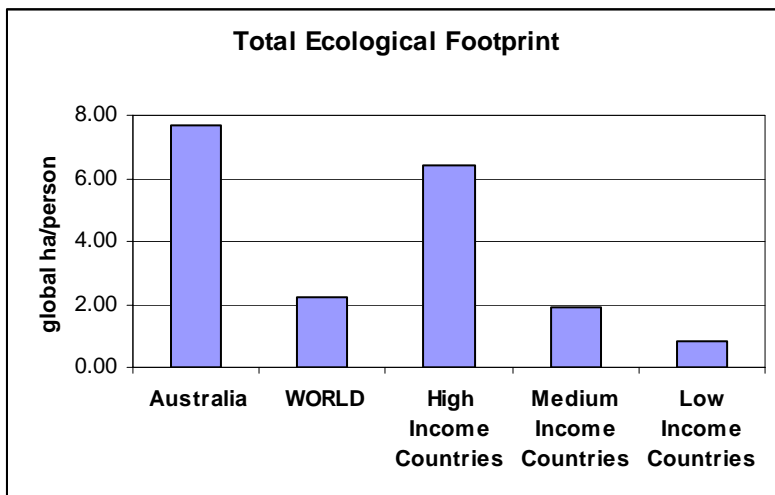


Figure 3. Total Ecological Footprint. Source: WWF (2004)<sup>11</sup>

<sup>9</sup> *Supra* 3

<sup>10</sup> Esty, D.C., Levy, M, Srebotnjak, T. and de Sherbinin, A. (2005) *2005 Environmental Sustainability Index: Benchmarking National Environmental Stewardship*. New Haven, Yale Centre for Environmental Law and Policy

<sup>11</sup> *Supra* 3

## *The Limits of Energy Efficiency*

Energy efficiency has its limits. For example, Verbruggen<sup>12</sup> found that the physical limits of energy intensity are reached at around 0.1-0.05 kWh/\$US-1998 GDP. Beyond that, any further limits of energy consumption need non-energy policies such as conservation. One cannot get infinite work out of finite energy.

By focusing on energy efficiency alone, the Productivity Commission is missing half the picture. One often hears politicians talking about economic growth and how important it is. But we live on a finite planet with finite resources. Unless humans establish large, self-sufficient space colonies, indefinite economic growth is not possible.

The other half of the picture is conservation, where people make do with less. That doesn't mean we should become destitute. It means that we should strike a healthy balance (both environmentally and physically) between meagre and excessive consumption. Perhaps we should adopt *Gross National Happiness*, as was coined by Bhutan's King Jigme Singye Wangchuck, rather than *Gross National Product*.

Rees<sup>13</sup> describes economic growth as a modern myth and that “[g]rowth has become the default solution to everything from our cumulative debt to nature to chronic poverty”. He later went on and wrote that:

“[T]he modern market model eschews moral and ethical considerations; ignores distributive equity; abolishes ‘the common good’; and undermines intangible values such as loyalty to person and place, community, self-reliance, and local cultural mores.”

Gare<sup>14</sup> wrote that:

“In the post-modern world of the late 20<sup>th</sup> Century, economics has taken the place of theology, economists have taken the place of medieval priests and the market has taken the place of God.”

## *Resource Limits*

The global economy expanded five-fold during the second half of the 20<sup>th</sup> Century, and about three-fold since 1980. At the same time, half the world's landmass has been modified for human purposes and more than half of the world's accessible fresh water is being used by people<sup>15</sup>. As the global economy grows, the biosphere degrades.

World Wide Fund for Nature (WWF) recently released a report<sup>16</sup> on humanity's impact on the biosphere. The findings are that:

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<sup>12</sup> Verbruggen (2003) *supra* 8

<sup>13</sup> Rees, W.E. (2002) An Ecological Economics Perspective on Sustainability and Prospects for Ending Poverty. *Population and Environment* 24(1): 15-47

<sup>14</sup> Gare, A. (2002) Human Ecology and Public Policy: Overcoming the Hegemony of Economics. *Democracy and Nature* 8(1): 131-141

<sup>15</sup> Rees (2002) *supra* 13

<sup>16</sup> WWF (2004) *supra* 3

- Humanity's ecological footprint is increasing, while species populations have decreased by about 40% from 1970-2000. In 2001, our ecological footprint was 2.5 times larger than in 1961, and was 20% larger than Earth's biological capacity. This overshoot is depleting Earth's natural capital and is unsustainable.
- Global energy use increased by 700% from 1961-2001
- Cropland areas remained static, with forest, grazing lands and fishing grounds showing small increases
- Consumption levels of industrialised countries (especially North America) are a lot larger than developing countries. Energy consumption is 14 times higher in high-income countries than low-income countries
- Global water use doubled from 1961-2001. The bulk of water usage is in agricultural areas, which grew about 75% during the time period. Industrial use more than doubled while domestic use grew four-fold. Water consumption levels in high-income countries are twice the level of middle- to low-income countries on average.

### *Conclusion*

Energy efficiency alone will not reduce energy consumption over the long term. To make a real difference, the consumerist and economic growth mentality that pervades Australian society will have to be removed and replaced with development within ecological limits.