

Doubling Energy & Resource Productivity by 2030

Unlocking a new \$25-30 Trillion Cumulative Increase to Global GDP & Transitioning to a Low Carbon Future through Sustainable Energy and Resource Management

Three Reports by Dr Michael H Smith (ANU)

Executive Summary

In 2014, and again in 2015, the OECD, IMF, and World Bank have published warnings that a slowdown in global economic productivity is threatening to usher in a new low-growth era.

These 3 reports address this problem by showing how doubling energy and resource productivity by 2030 can:

- Enable simultaneous significant improvements in labour, capital and multi-factor productivity through improved rates of production, greater labour participation, quicker returns on capital expenditure, avoided capital misallocation as well as reduced energy and resource input costs.
- And thereby, achieve total productivity benefits are up to 2.5 times greater than the simple productivity benefits from reduced energy and water input costs from energy/resource productivity investments.

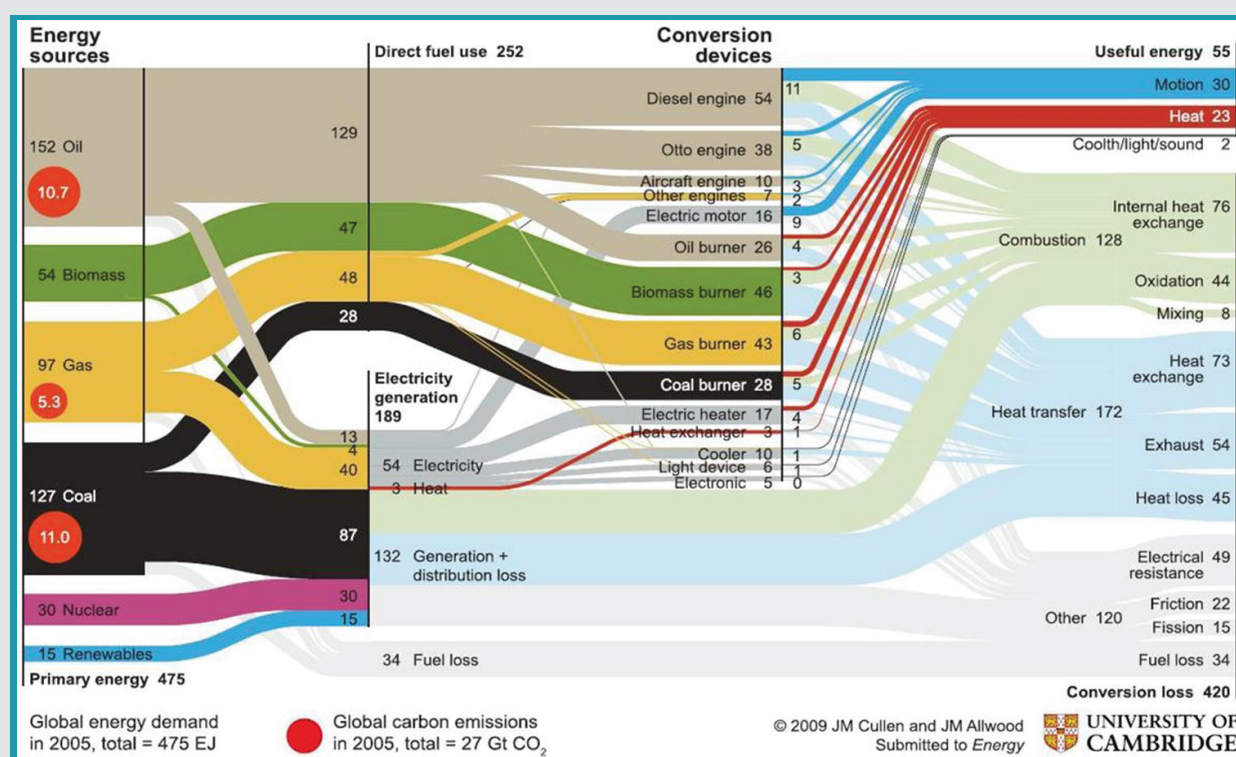
These reports show, for the first time, how this could thereby boost cumulative global GDP >US\$25-30 Trillion by 2030 compared to business

as usual (BAU) whilst improving business competitiveness.

These three reports show that a focus on doubling energy and resource productivity by 2030 can enable climate change to be addressed in ways that boost economic and jobs growth and help achieve development goals. The implications of this result are significant for everything from progressing the next UNFCCC Paris COP on Climate Change to business strategy and policy debates.

The Energy Productivity Opportunity

Energy Productivity – Potential to Boost GDP, Jobs and other Co-Benefits – The International Energy Agency finds that investing in energy efficiency opportunities by 2030, could alone boost global GDP by over \$15 Trillion above BAU. Such significant productivity gains exist partly because current processes to convert energy sources into useful forms of energy are highly inefficient. Currently 88% of primary energy resource is wasted.



Also, investments in energy efficient transport systems and encouraging people to use more active forms of transport (public transport, cycling, walking) have additional productivity benefits through reduced air-pollution, urban congestion and health costs from diseases of physical inactivity. These respectively globally cost >US\$3.5, US\$2-4.3, and >US\$3 Trillion per annum. Hence reducing these costs will result in significant health and productivity co-benefits.

USA Commits to a National Energy

Productivity Target: President Obama has already recognised this and convened a national taskforce on this topic. Based on their work he has adopted a commitment to double US energy productivity by 2030. The “US Energy Productivity Roadmap” study shows that a doubling of energy productivity by 2030 would boost US GDP growth by 2% above business as usual, achieving per annum savings of US\$327 billion per year, reducing oil imports as well as achieving significant greenhouse gas reductions. A focus on improving energy productivity, including the USA transport sector, could also enable further productivity co-benefits through reduced USA congestion costs, air pollution costs, and costs of diseases of physical inactivity. These respectively cost >US\$50-120 billion, US\$75-280 billion, and >US\$60 billion per annum.

Australian Government Commits to Developing a National Energy Productivity Roadmap with Targets:

The Commonwealth Government of Australia, in the new 2015 Energy White Paper has also recognised the significant benefits of energy productivity, committing to developing a national energy productivity roadmap. Studies show that Australia could double energy productivity by 2030 adding ~AUD\$35-50 billion respectively to the GDP above BAU. The Alliance to Save Energy in partnership with partners such as UTS ISF and ANU Energy Change Institute has been developing a national energy productivity roadmap for Australia in partnership with government and business to help realise this opportunity. Many other nations in the Asia Pacific, such as, China have also committed to purposeful energy productivity targets to reduce rising energy demand and air pollution and improve energy security. It is possible therefore to build on these precedents in the energy productivity space, to more easily convince decision makers to now make similar commitments to

doubling resource productivity by 2030 and developing national resource productivity roadmaps.

The Resource Productivity Opportunity

Resource Productivity Targets can Help Achieve Energy Productivity Targets and Vice

Versa: Resource productivity strategies – such as reducing waste, resource efficiency, product stewardship and recycling – often yield energy productivity co-benefits and vice versa. The availability of these strong “win-win” synergies means that nations and businesses, which commit to both energy and resource productivity targets will find a focus on resource productivity gives nations and businesses additional cost effective ways to improve energy productivity. This will make it easier and more cost effective for nations and business to achieve their energy productivity targets whilst also achieving a larger overall boost to national GDP, jobs growth and business profits. Hence there is an opportunity here for both the USA and Australia governments to adopt resource productivity targets to help them i) achieve their existing energy productivity targets, (ii) reduce vulnerability to resource price shocks and (iii) risks of resource scarcity for rare earth metals and other critical commodities.

Resource Productivity Through Transitioning to the Circular Economy – Potential to Boost Global GDP and other Co-Benefits:



Resource productivity strategies, such as resource efficiency, remanufacturing and recycling, result in lifecycle energy and water savings thus also improving energy and water productivity. This makes it easier for nations to achieve their energy productivity targets. Improving resource productivity could add around US\$1 Trillion per annum (or cumulatively at least >US\$5 Trillion) to global GDP by 2025.

Natural Resource Productivity – Potential to Boost Global GDP and other Co-Benefits –

To feed the world, by 2050, food production will need to increase 70%. Yet, due to land degradation, already 30% of arable farmland globally is unproductive. The global annual economic costs of food waste, deforestation/land degradation, invasive species and unsustainable management of wild fisheries are respectively ~US\$1 Trillion, EU\$400 Billion-650 Billion, US\$1.4 Trillion and US\$50 Billion per annum. Their costs to specific nations can be significant. For instance, they cost the US economy >US\$350 Billion per annum. Pro-actively addressing these issues could add > US\$2-3 trillion cumulatively to the global GDP by 2030 whilst enhancing food security.

Water Resource Productivity – Potential to Boost GDP, Jobs and other Co-Benefits –

As this report shows, smart water productivity investments through reducing water leakage rates, improving water efficiency and low carbon sustainable water management practices could cumulatively boost global GDP by ~US\$1-2 Trillion by 2030 whilst achieving significant energy productivity co-benefits as well. Many of the best ways to save water, save energy and vice versa.

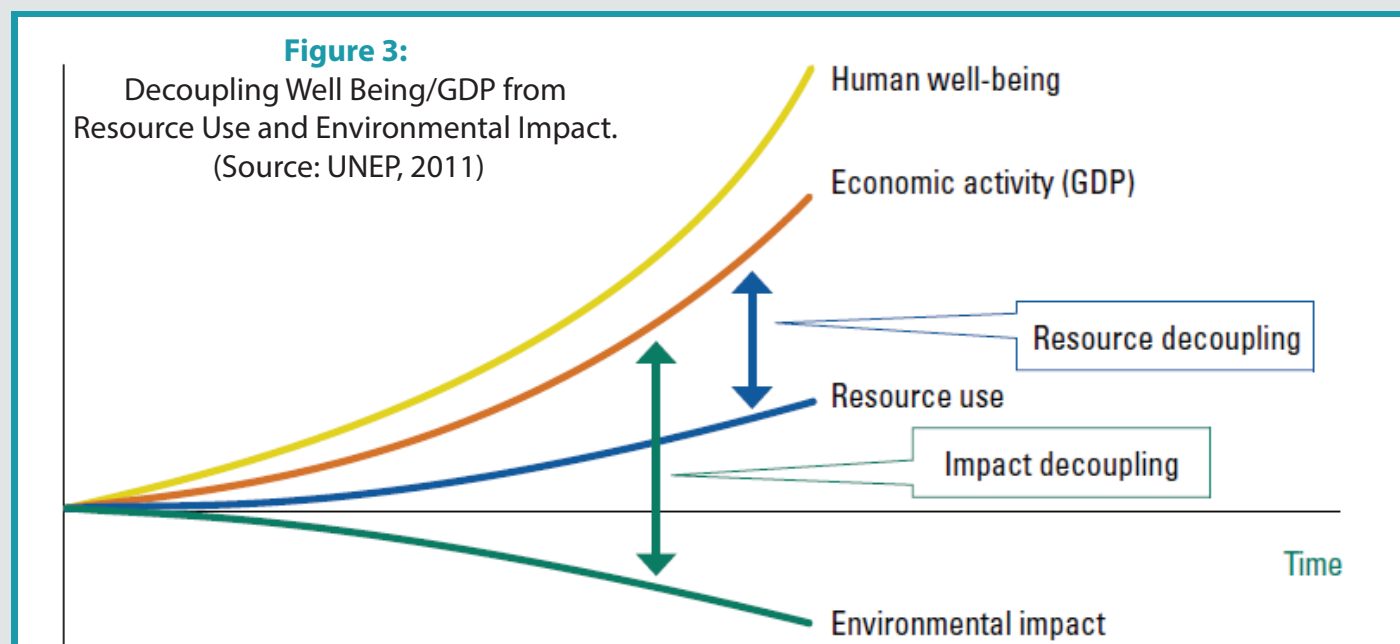
Implications for Climate Change – Action on Climate Change Could Boost Economic Growth

– International Energy Agency and Global McKinsey Institute reports show that a focus on improving energy and resource productivity will cut >70% the required greenhouse emissions by 2030 to keep global warming under 2 degrees.

This means that a focus on improving energy and resource productivity enables nations to mitigate greenhouse gas emissions in ways that boost economic growth. A recent ClimateWorks Australia study into Australia's Energy Productivity Potential showed that if Australia doubles its energy productivity by 2030, this will ensure Australia is on track to achieve deep cuts to emissions by 2050. Climate mitigation, plus adaptation, also is "productivity enhancing" because it significantly reduces the costs of climate change estimated to be ~\$1.2 Trillion in 2013 and which, without mitigation, could cost >10% of global GDP by 2100.

Implications for Green Growth

It is important to note that increasing the rate of energy and resource productivity is fundamental to decoupling economic growth from energy and resource consumption and associated environmental pressures to achieve "Green Growth." (See Figure 3 Below) Proponents of "Green Growth" have argued that it can enhance economic growth above BAU but have never suggested "by how much". This is the first report to show how a focus on "Green Growth" could enhance global GDP by as much as US\$25-30 Trillion above BAU by 2030.



Energy and Resource Productivity Enabling Technologies - A New Wave of Innovation:

Finally, these reports, show that there is potential for a new wave of innovation made possible by advances in energy and resource productive enabling technologies. These technologies, can help nations and business to unlock new sources of labour, capital and multi-factor productivity - through improved rates of production, greater labour participation, quicker returns on capital expenditure, avoided capital misallocation as well as reduced energy and resource input costs.

Hence, the report shows the value to governments and businesses of adding a focus of doubling energy and resource productivity to their productivity agenda's. To help do that, this report is complimented by:

- **Report #2 – Doubling Energy and Resource Productivity by 2030 - A Guide for Policy Decision Makers** - which evidences the value of adopting national targets to double energy and resource productivity by 2030, and policy options to achieve such goals.
- **Report #3 – Doubling Energy and Resource Productivity by 2030 - A Guide for Business Leaders** - which shows, business sector by sector, how doubling energy and resource productivity by 2030 is key to improving business competitiveness and productivity.

These three new reports are available from the World Resources Forum's News and Reports web page at <http://www.wrfasiapacific2015.net/>

They are also accessible from Dr Michael Smith's Education and Resources Publications page at <http://sustainability.edu.au/material/profile/225/>

BOX 1 –Studies Evidencing The Energy and Resource Productivity Opportunity

These three reports empirically evidence that a focus on both energy and resource productivity (including natural resource productivity) could achieve at least >US\$25-30 trillion boost to global GDP by 2030 by integrating and building on over 300 references including the following landmark studies;

The International Energy Agency 2012 *World Energy Outlook* reports "Energy Efficient World" scenario showed that a focus on energy efficiency could boost global GDP growth cumulatively by US\$18 Trillion by 2035 above BAU, reduce the need for new energy supply capital and fuel costs by US\$7 Trillion each.

International Energy Agency 2014 study *Capturing The Multiple Benefits Of Energy Efficiency* shows that the overall productivity benefits of investment in energy efficiency can be 1.5-2.5X that of the direct benefits from energy cost savings.

UNEP International Resource Panel's *Decoupling 2: Technologies, Opportunities and Policy* report found that a focus on energy and resource productivity could add US\$1-3 Trillion per annum by 2025-2030.

The World Bank and ClimateWorks (USA)'s "Climate-Smart Development" report shows that improving global energy efficiency performance could boost global GDP by US\$1.6-2.6 Trillion per annum by 2030.

A2SE and partners 2014 report on *Australia's Energy Productivity Opportunity*, evidences the potential for improving energy productivity in many countries and the broader productivity benefits of doing so.

McKinsey Global Institute's 2011 *Resource Revolution* study shows that a focus on energy and resource productivity improvement could increase global GDP US\$2.9 trillion per annum by 2030 above BAU.

The World Economic Forum's *Circular Economy Program's* Report cites modelling which shows that improving resource productivity could add an additional US\$1 Trillion per annum to global GDP by 2025.

The United Nations (UN) and European Union (EU) study entitled *The Economics of Ecosystems and Biodiversity* showed that the costs of inaction on preservation and restoration of natural resources would cost the global GDP as much as \$7 Trillion per annum by 2050.

Food & Agriculture Organisation's *Food Waste Global Footprint* study shows that food waste is already costing the global economy US\$1 Trillion per annum and that there is significant potential to reduce this.

The World Bank's *Sunken Billions* study showed that annual productivity losses through over-fishing has been around US\$50 billion per annum for 30 years, or around US\$2 Trillion over the last three decades.