

# An Australian Healthcare Sustainability Unit (HSU)

## DEA Proposal

### Executive Summary

- The Australian healthcare sector is one of the largest sectors of our economy, with expenditure approaching 10% of GDP.<sup>1</sup> The CO<sub>2</sub> emissions of the sector are also significant, estimated at over 7% of Australia's total CO<sub>2</sub> emissions,<sup>2</sup> thus there are significant environmental, as well as financial costs.
- Healthcare nationally, and globally, is a significant contributor to greenhouse gas emissions, waste products and natural resource consumption, all of which potentially affect, or threaten, our present and future health.
- The future of expanding, high quality healthcare relies on it being delivered in ways that are both financially and environmentally sustainable.
- To a large extent, the changes needed to improve environmental sustainability in healthcare are the same as those needed to deliver financial sustainability and quality improvements; all entail efficiency driven by evidence-based practices and judicious use of resources.
- Encouraging public health prevention measures to prevent/minimise non-communicable diseases (NCDs) e.g. diabetes (type 2) and obesity, would also improve environmental sustainability and simultaneously improve individual health, lower hospital admissions and reduce the financial and environmental impacts of chronic medical care.
- Efforts to reduce unnecessary testing (e.g. Choosing Wisely's initiatives<sup>3</sup> in pathology and radiology) will have large financial and possibly environmental benefits.
- The UK's National Health Service (NHS) Sustainable Development Unit was the first government body worldwide to regularly begin measuring the carbon footprint of the health service. Between 2007 and 2015, the NHS achieved an 11% reduction in greenhouse gas emissions (in line with national targets) while the level of health care activity rose by 18%. By 2017, the associated financial savings associated with environmental sustainability (mainly energy, waste and water) rose to £90 million annually.<sup>4</sup>
- Numerous Australian and State Governments (present and past) have indicated a commitment to developing climate change solutions and practical, direct actions to improve the environment. A Healthcare Sustainability Unit (HSU) fits as an integral part of this commitment.
- The formation of a sustainability unit for the Australian healthcare system would be a practical initiative that would deliver significant environmental, financial and quality benefits, at a comparatively minimal cost.

# A National Healthcare Sustainability Unit (HSU)

## Proposed objectives:

1. Environmental benefits (with associated health and health cost benefits).
2. Financial benefits.
3. Quality healthcare benefits.

A Healthcare Sustainability Unit (HSU) would assist the Australian health care system (primary, secondary and tertiary) to deliver quality health care in environmentally and financially sustainable ways. A HSU could lead research, policy development, system changes and education of staff, fulfilling a central national co-ordinating role for maximum effectiveness and successful implementation of initiatives at state, regional, health network, hospital and practice levels.

### **A HSU needs to encompass all practises within health services and cannot be limited to addressing energy efficiency of buildings and travel emissions.**

Of the 7% of CO<sub>2</sub> emissions that Australia's health care sector contributes, hospitals are responsible for 44%, pharmaceuticals for 19%, capital expenditure 8%, community and public health 6% and general practice 4%.<sup>2</sup>

Detailed UK NHS audits have shown that procurement (of goods and services) is responsible for the greatest proportion (65%) of healthcare carbon footprint in England, followed by building energy 19%, and patient and staff travel 16%.<sup>5</sup>

Correspondingly for effective outcomes, a broader mandate to evaluate, research and advise on evidence-based procurement protocols and healthcare practices is required. Particular emphasis on pharmaceutical procurement, prescribing, administering and disposal practices could result in significant financial, environmental and quality benefits: pharmaceuticals make up 22% of NHS-England's total CO<sub>2</sub> emissions.

## Proposed priorities:

1. A national consultation with health sector bodies canvassing current and planned initiatives in relation to environmentally sustainable healthcare;
2. Further targeted measurement of the carbon footprint and environmental impact of Australian health services;
3. Development of a sustainability strategy for the Australian health sector including preventive healthcare, primary/community care and hospital care;
4. Researching and developing innovations (technological, clinical, organisational etc.) that will improve the sustainability of healthcare;
5. Social and psychological research to understand the behaviour, attitudes and cultures that will be needed within healthcare to improve sustainability;
6. Policy research to clarify how the overall design of health systems influences the uptake of sustainable behaviour and innovations;
7. Implementation of strategies to improve the environmental sustainability of the health system;
8. Development of strategies or policies that minimise the need for escalation of care and the associated increases in resources and costs within the healthcare system;
9. Assessment of the anticipated effects from environmental impacts and climate change on health care services.

## Proposed Structure:

An Australian HSU could be modelled on the Sustainable Development Unit (SDU) in the United Kingdom, a well-established and world leading unit that has proved very effective at improving the sustainability profile of the NHS. The SDU, has a small (less than 10 full-time staff) multi-skilled team, consisting of a director, operational director, communications manager, organisational development lead, project officer, technical/metrics lead and an administrator.

The unit could be hosted by an existing health organisation (or within the Department of Health) in order to share use of offices, human resources, finance and IT systems. A HSU would work in close partnership with Australia's extensive network of clinical, regional and health services leaders. There would also be close links with health organisations, academic institutions (research) and existing health-environmental initiatives.

An Australian HSU would also work closely with any state based HSUs.

## Background and current challenges

*"Sustainability means more than merely lasting or surviving, it means designing and delivering health care that uses resources in ways that don't prejudice future health and wellbeing."*<sup>6</sup>

The Australian health system faces significant challenges. The burden of chronic diseases (NCDs) is rapidly increasing, our population is aging, medical technology continues to advance, and climate change is predicted to increasingly threaten our health and wellbeing. In this context, the future of expanding, high quality health care relies on it being delivered in ways that are both financially and environmentally sustainable.

Currently, healthcare uses vast quantities of resources and has a significant carbon footprint of over 7% of Australia's total carbon footprint.<sup>2</sup> This is reinforced by data from individual states, for example Victoria's public healthcare contributes 25% of all the state's government energy CO<sub>2</sub> footprint.<sup>7</sup> Hence, the environmental price of healthcare is high and unlikely to be sustainable or acceptable in the longer-term, particularly as national and global efforts to reduce carbon usage and combat climate change intensify. The financial price is also high, with national expenditure on healthcare over the period 2013-14 approaching 10% of GDP, rising gradually from 6.5% of GDP in 1990.<sup>1</sup>

Fortuitously, however, many of the changes needed to improve environmental sustainability within healthcare are the same as those needed to deliver financial sustainability and quality improvements. For example, processes that promote resource and waste efficiency, prevent avoidable activity, focus on value and cost-effectiveness, and place greater emphasis on primary care, prevention and self-management will generally benefit **all 3 objectives of a HSU – namely improved environmental, financial and healthcare quality outcomes.**

### 1. Environmental benefits (with associated health and health cost benefits).

Healthcare's environmental footprint is significant; England's NHS produces around 4% of the country's total carbon emissions<sup>5</sup>. In the United States, 10% of that nation's CO<sub>2</sub> emissions originate from healthcare,<sup>8</sup> whilst in Australia healthcare contributes 7% of the total, national CO<sub>2</sub> emissions.<sup>2</sup>

In addition to benefitting the environment, reduction of healthcare's greenhouse gas emissions could decrease both ill health and health expenditure. Air pollution from fossil fuel combustion is linked to a broad range of conditions including cardiovascular disease, stroke, cancer, asthma and chronic lower respiratory tract disease.<sup>9</sup> Epidemiological studies have also shown clear links between air pollutants from fossil fuels and all cause, cardiovascular and lung cancer mortality.<sup>10</sup>

<sup>11</sup> Approximately 3,000 deaths per annum in Australia are attributable to air pollution – double our average annual road toll.<sup>12</sup>

In terms of the financial impact of air pollution, the annual Australian health cost of air pollution is estimated to be over \$11 billion whilst in Sydney alone it is about \$4.7 billion.<sup>13</sup> The international organisations Health Care Without Harm (HCWH) and the Health and Environment Alliance (HEAL) estimated that a 30%, rather than 20% target, reduction in greenhouse gas emissions from 1990 levels by 2020 in the European Union (EU) would produce health savings from concurrent decreases in fossil fuel derived air pollutants of between €10.5 and €30.5 billion per year.<sup>14</sup>

Eckelman and Sherman published modelling in 2016 that estimated the potential harmful effects on public health from the USA's health care sector's direct and indirect pollution emissions to be significant at 405,000 to 470,000 disability-adjusted life years (DALY). They estimated in 2013 US health care was responsible through its direct and indirect emissions for significant fractions of national air pollution and subsequent public health burdens; acidification (12%); smog formation (10%); respiratory disease from particulate matter (9%) and; ozone depletion and carcinogenic and non-carcinogenic air toxics (1–2%).<sup>8</sup>

Perhaps even more significantly, anthropogenic greenhouse gas emissions over the last century are contributing to significant changes in our climate<sup>15</sup>. This is already having direct and indirect effects on health both globally and locally and is predicted to increasingly do so into the future. In 2009, a joint Commission by the Lancet and University College of London described climate change as "*the greatest threat to human health of the 21<sup>st</sup> Century*". The World Health Organization (WHO) has similarly emphasised that 'the real bottom-line of climate change is its risk to human health and quality of life'. Australia is particularly vulnerable to extreme weather events arising from climate change and is already dealing with their associated health effects and costs.<sup>16</sup> For example, the heatwave preceding Victoria's 2009 Black Saturday fires is considered to have contributed to more than double the number of deaths (n=374) than the fires themselves (n=173).

A HSU would be ideally placed to measure emissions and evaluate, research and advise on the most appropriate and effective carbon reduction strategies for the healthcare sector.

As highlighted in British Medical Journal, the **healthcare system has 'a responsibility to get its own house in order, to avoid the paradox of doing harm while seeking to do good'**.<sup>17, 18</sup>

In addition to changes at the institutional level, there is a requirement for structural changes to our current treatment-orientated health system with its focus on tertiary institutions. The illnesses (NCDs) that now produce the largest disease burden in Australia such as cardiovascular disease and Type 2 diabetes are largely preventable, yet the funds we allocate to public health are less than 2% of our overall health budget.<sup>19</sup> At the same time, the costs of the medications to treat these conditions are major contributors to our pharmaceutical expenditure. A greater emphasis on primary and preventive health care is required to address these problems sustainably and cost-effectively.

Primary health is the interface in our current health system for the initial diagnosis and management of a wide range of chronic diseases (NCDs) including obesity, type 2 diabetes and cardiovascular disease. International evidence suggests that a strong primary health care orientation within the health system is associated with reduced costs, increased efficiency, lower rates of potentially preventable hospitalisations and better population health outcomes.<sup>20, 21, 22, 23</sup> This has been acknowledged by the Australian Government in *Australia's Health 2014*, where it was stated "*A strong and readily accessible primary health care system is ... vital in reducing pressure on public hospitals through access to advice and services in the early stages of disease and a broader geographic distribution of suitably skilled health professionals compared to the concentration of specialists in urban areas*".<sup>24</sup>

***"Ultimately, the most sustainable system is one that minimizes unnecessary or ineffective use of resources by delivering the right care, in the right place, at the right time – and by preventing care needs from arising at all."***<sup>25</sup>

## 2. Financial Benefits

The high resource use, waste production (Appendix 1) and inefficiencies inherent in healthcare place strain on operating margins. In addition, they divert finances needed for other critical healthcare issues, many of which will worsen due to our changing climate. Environmentally sustainable approaches to the delivery of health care encourage greater efficiency of resources, whether these be energy, water, staff, medications, products (clinical or non-clinical) or procedures. They thereby have the potential to generate significant cost savings.

Many examples of this exist.

### *National*

- At Mater Misericordiae, Brisbane, since 2008 more than 190 initiatives have been implemented or explored, involving thousands of staff and saving more than \$2.3m for the organisation.<sup>26</sup>
- Environmental and financial Life Cycle Analysis research<sup>27, 28</sup> conducted at Footscray Hospital, Victoria, has led to 1) a change from single use to reusable operating room circuits, face masks, plastic trays and other anaesthetic equipment saving more than \$40,000 per annum for the hospital's six operating rooms and 2) shut down of selected steam sterilisers at times of low activity leading to savings of \$15,000 per annum.<sup>29</sup> It should be noted that reusing equipment requiring sterilisation does not always result in less greenhouse gas emissions if the energy source is from a high CO<sub>2</sub> emissions intensive source such as brown coal.
- Western Health anaesthetists switched their use of anaesthetic gas from the expensive desflurane with a high global warming potential (GWP) to sevoflurane, a less expensive anaesthetic gas with a lower GWP, saving the hospital yearly about \$30,000 and 140 tonnes of CO<sub>2</sub> emissions.<sup>30</sup>
- Energy efficiency measures arising as a result of the Victorian Greener Government Buildings Program are helping the state's health sector to save over \$100 million in energy costs.<sup>31</sup>
- A consortium of Australia's leading critical care researchers have shown that use of saline solutions is as effective, and possibly safer, than more expensive albumin solutions (\$1.60/litre vs \$332/litre); Access Economics has estimated that if practices were fully in line with this finding, for only one condition, there would be a net benefit of around \$687 million per annum in Australia.<sup>32</sup>

### *International*

- University College London Hospitals (UCLH) NHS Foundation Trust, has reported £100,000 savings in electricity costs per annum since installing software to automatically shut down office computers over weekends.<sup>33</sup>
- Across the NHS, cost savings in excess of £10m over a 4-year period have been reported from energy saving initiatives, despite concurrent increases in activity.
- UK NHS studies have indicated that reducing pharmaceutical wastage could offer significant financial return on investment.
- An Italian study has comprehensively examined the financial and ecological costs of dialysis waste to the Italian health system, proposing cost savings in the order of €45–52.5 million (US\$60–70.30 million) per year from appropriate and maximal waste segregation.<sup>34</sup>
- A United States study has shown that widespread implementation of programs to reduce energy use and waste and achieve operating room supply efficiencies could achieve savings in excess of \$5.4 billion over five years and \$15 billion over 10 years.<sup>35</sup>

In coordinating these changes, hospital sustainability managers are integral, and their wages can be funded by the savings from sustainability strategies they assist in implementing.<sup>36</sup> For example, the University College London Hospitals (UCLH) NHS Foundation Trust employs a

dedicated sustainability development officer funded entirely on savings made as a result of its sustainability strategy.<sup>33</sup>

A national HSU could encourage the employment of hospital sustainability managers by developing business cases for the initial employment cost outlay, as well as providing ongoing training for and communication networks between officers employed across the country.

### 3. Quality benefits

Improving environmental sustainability within healthcare could also produce direct health and treatment benefits. For example, measures that make better use of new technologies, develop more integrated forms of care, ensure practices are supported by robust evidence where ever possible and remove duplication and redundancy from care pathways all have the potential to reduce environmental impacts while improving patient experience and outcomes.

Data from the United States suggest that less than 50% of current treatments are supported by evidence and 30% of health care expenditure reflects care that is of uncertain value.<sup>37</sup> Furthermore, studies testing established clinical standards of care have shown that more than half of the reported evidence contradicts standard care or is inconclusive. As emphasised in a paper in the Medical Journal of Australia (MJA) in 2013, *'Meaningful healthcare reform requires robust evidence about which interventions work best for whom and under what circumstances'*.<sup>37</sup> In this paper, the importance of Comparative Effectiveness Research (CER) was discussed. For CER, the emphasis is on comparing new or existing interventions to one or more non-placebo alternatives, which may include 'usual care', as occurred in the albumin versus saline critical care trial.<sup>32</sup> While CER uses a wide range of research methods, including randomised controlled trials, observational studies, and systematic reviews, its core purpose is to identify what clinical and public health interventions work best for improving health. In both the US and the UK, CER plays a central role in informing health care policy and changing clinical practice.<sup>37</sup> In Australia, however, there is no particular group or agency that includes CER as a major focus of activity.<sup>37</sup> **A Health Sustainability Unit could provide vital input for prioritising CER questions and implementing CER findings into practice and policy making.** This would be expected to generate better return on investment for health care expenditure and better treatment and environmental outcomes, due to the right treatment being implemented at the right time.<sup>37</sup>

Sustainability should also increasingly be seen as an essential dimension of quality akin to equity or accessibility, with mechanisms to monitor and hold the system to account for its environmental performance.

### The International Context

There are a number of environmental sustainability units operating very successfully in health systems around the world. In the United Kingdom, the Sustainable Development Unit (SDU)<sup>38</sup> was established in 2008 with the aim of addressing sustainability across the NHS, focussing on carbon reduction. The SDU is a small group of less than 10 staff who have taken on a leadership role in the large challenge of reducing the UK National Health Service's carbon emissions, whilst maintaining healthcare's capacity to care for its citizens. The role of the SDU has since been expanded to include the entire English health care, public health and social care systems. The SDU is also broadening its activities from purely carbon reduction to all aspects of sustainability, including efforts to change healthcare's models of care such as treating more people at home, encouraging preventive medicine and trialling methods of payment for doctors to keep patients well, rather than treating the sick.<sup>39</sup>

- Between 2007 and 2015, the NHS achieved an 11% reduction in greenhouse gas emissions (in line with NHS and national targets) while the level of health care activity rose by 18%.<sup>4</sup>

- By 2017, the associated financial savings associated with environmental sustainability improvements (mainly reduced energy, waste and water) rose to £90 million annually, far exceeding the cost of staffing the SDU.<sup>4, 40</sup>

Government sustainability units associated with healthcare also exist in France<sup>41</sup> and Austria<sup>42</sup>. The Australian Healthcare and Hospitals Association was a founding member of the Health Care Without Harm led Global Green and Healthy Hospitals network. The scheme offers a framework and sets goals<sup>43</sup> for hospitals and health systems around the world to follow to achieve greater sustainability and improved public environmental health. Several Australian hospitals having joined the network (coordinated by the Climate and Health Alliance in Australia).<sup>44</sup>

There are calls for healthcare to act more sustainably from international health bodies including WHO<sup>45</sup> and Health Care Without Harm<sup>43</sup> and from editors of major medical journals (e.g. The Lancet, The British Medical Journal and the New England Journal of Medicine).

## Conclusion

Whilst there are innovative and successful individual initiatives in improving the sustainability of Australia's health services, they are fragmented and lack any overall national strategic direction. Hence, financial and environmental savings are at particular risk of being forgone. A national Healthcare Sustainability Unit (HSU), with extensive networks of frontline/clinical and regional leads, would coordinate such efforts and work with any comparable state units in place. This would ensure that best practice and innovations are researched, disseminated and shared, ensuring maximum benefit for the whole health system and the Australian public in relation to environmental, financial and healthcare quality improvements.

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# DEA supporting documents

DEA Health Sector Sustainability (HSS) Discussion Paper. *Improving the environmental sustainability of Australia's health sector: cost, quality and environmental benefits.*

DEA Improving a hospital's environment impact: what can a doctor do? *A practical guide to achieving change.* <https://www.dea.org.au/wp-content/uploads/2018/05/DEA-SustainableHospitals---Practical-Assistance---05-18.pdf>

DEA Sustainable Hospitals – Response to the Victorian Climate Change Green Paper, 2011. Available at <https://www.dea.org.au/sustainable-hospitals-response-to-victorian-climate-change-green-paper-healthy-planet-healthy-people-dea/>

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## Appendix 1

# Improving waste amounts and segregation within the health system

Healthcare practices tend to produce large amounts of waste yet recycling and waste minimisation practices are not co-ordinated across the country or even encouraged in many facilities even though implementing changes can be relatively easy, have financial benefits and be the first step in engaging staff to think and act for improved sustainability at work.

Disposal of hospital clinical (infectious) waste is commonly 10 times the cost of general waste and requires high temperature incineration or chemical treatment followed by shredding prior to deposition in landfill.<sup>1</sup> Large environmental, financial (and possibly health) co-benefits could be achieved through more rigorous separation of hospital infectious and general waste.

Although local councils have been collecting road-side co-mingled waste to recycle for many years hospitals often still deposit similar objects into landfill. Significant reduction in landfill waste can be achieved by proper recycling of paper, cardboard, plastics and even food waste. In 2007 a regional Victorian hospital disposed of 100 tonnes of compost waste (20% of general waste) to a worm farm rather than to landfill.<sup>2</sup>

Manufacturing recycled plastics uses less than half of the energy compared to equivalent primary plastic products with less, though still significant savings for glass and cardboard.<sup>3</sup> Some hospitals have plastic recycling programs though it is by no means ubiquitous even in our capital cities. A Melbourne metropolitan plastic recycling company is currently converting polypropylene surgical instrument wrap (Kimguard®) into plastic products such as boardwalks and outdoor furniture.<sup>4</sup> There are also pilot plastic recycling projects which take ampoules, syringe barrels, intravenous cannula covers and surgical wrap to make plastic flooring.<sup>1</sup> In addition a program started in a medium sized Melbourne hospital to recycle polyvinylchloride (PVC) into irrigation pipes<sup>5</sup> - relevant as PVC comprises a significant proportion of medical plastics<sup>6</sup> and cannot be recycled with other plastic- has lead more hospitals to now also recycle PVC.

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<sup>1</sup> McGain F, Story D, Hendel S. An audit of intensive care unit recyclable waste. *Anaesthesia* 2009; **64**(12): 1299-302.

<sup>2</sup> Jackson H, Shiell A. How much does Australia spend and is it enough? 2017. [http://fare.org.au/wp-content/uploads/Preventive-health-How-much-does-Australia-spend-and-is-it-enough\\_FINAL.pdf](http://fare.org.au/wp-content/uploads/Preventive-health-How-much-does-Australia-spend-and-is-it-enough_FINAL.pdf).

<sup>3</sup> Australia. Department for the Environment. Submission to the Senate Inquiry for Recent trends in and preparedness for extreme weather events. 2013. . [http://dea.org.au/images/uploads/submissions/Extreme\\_Weather\\_Events\\_Submission\\_01-13.pdf](http://dea.org.au/images/uploads/submissions/Extreme_Weather_Events_Submission_01-13.pdf)

<sup>4</sup> McGain F, Clark M, Williams T, Wardlaw T. Recycling plastics from the operating suite. *Anaesthesia and Intensive Care* 2008; **36**(6): 913-4.

<sup>5</sup> McGain F, Story D, Kayak E, Kashima Y, McAlister S. Workplace sustainability: the "cradle to grave" view of what we do. *Anesthesia and Analgesia* 2012; **114**(5): 1134-9.

<sup>6</sup> McGain E, Hendel S, Story D. An audit of potentially recyclable waste from anaesthetic practice. *Anaesthesia and Intensive Care* 2009; **37**(5): 820-3.

Appropriate waste management can achieve large financial, environmental and health co-benefits (e.g. preventing the release of dioxins and other toxic products when plastics like PVC are incinerated), however far more significant benefits would undoubtedly be obtained with less waste generation to begin with. For example in 2008 each patient in UK hospitals produced 5.5 kg of clinical waste per day.<sup>7</sup> Australian estimates were similar whereas French and German hospitals generated 1.9 kg and 0.4 kg per patient per day respectively.<sup>7</sup> Therefore critical analysis into why our hospital waste amounts are comparatively so great is needed to achieve the maximum benefits in waste minimisation and recycling programs. Amounts of clinical waste in particular should be examined as it is estimated to have higher fossil carbon content compared with general waste,<sup>8</sup> requires extensive treatment before depositing into landfill and, as already stated, is commonly 5-10 times the expense of general waste to dispose of.

Water is a scarce, valued resource in many parts of the world (including Australia). Changes in practises to minimise use and recycle could have significant environmental and financial benefits to an area and institution. For example in Lyon, France, a 173 patient haemodialysis facility has reported annual savings of 1.2 million liters of water from capture and reuse of RO 'reject' water, with a 6-year return on investment;<sup>9</sup> and annual savings in the order of 470 million liters of water, 11,000 t CO<sub>2</sub> -eq of greenhouse gases and 7 million UK pounds (10.6 million USD) have been reported from water conservation measures in haemodialysis in the UK.<sup>10</sup>

For further detail on specific energy, procurement, travel, water, waste and medical gas proposals to improve the environmental sustainability of our hospitals refer to DEA's 2009 submission to the Victorian Government Green Paper.<sup>11</sup>

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<sup>7</sup> Tudor TL, Marsh C, Butler S, Van Horn J, Jenkin L. Realising resource efficiency in the management of healthcare waste from the Cornwall National Health Service (NHS) in the UK. *Waste Management* 2008; **28**(7): 1209-18.

<sup>8</sup> Lee B-K, Ellenbecker MJ, Moure-Ersaso R. Alternatives for treatment and disposal cost reduction of regulated medical wastes. *Waste Management* 2004; **24**(2): 143-51.

<sup>9</sup> Ponson L, Arkouche W, Laville M. Toward green dialysis: focus on water savings. *Hemodialysis International* 2014; **18**(1): 7-14.

<sup>10</sup> Connor A, Mortimer F. The green nephrology survey of sustainability in renal units in England, Scotland and Wales. *Journal of Renal Care* 2010; **36**(3): 153-60.

<sup>11</sup> (DEA). DftEA. Doctors for the Environment Australia, submission. Sustainable Hospitals-Response to Victorian Climate Change Green Paper, 2009.

[http://dea.org.au/images/general/DEA\\_Vic\\_Green\\_Paper\\_Sust\\_Hosp.pdf](http://dea.org.au/images/general/DEA_Vic_Green_Paper_Sust_Hosp.pdf)

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