



**Nursery & Garden Industry  
Australia**

**Parliament of Australia  
Senate Standing Committee on Environment and  
Communications**

**Inquiry into  
The Government's Direction Action Plan**

**A Submission by  
Nursery & Garden Industry Australia (NGIA)**

**January 2014**

Prepared by Dr. Anthony Kachenko and Mr. Chris O'Connor

Inquiry into  
The Government's Direction Action Plan

**About Nursery & Garden Industry Australia (NGIA)**

Nursery & Garden Industry Australia is the peak national industry body representing producers, retailers and allied traders involved in the production of plants across all states and territories of Australia. In partnership with state and territory peak bodies, NGIA is responsible for overseeing the national development of the Australian nursery industry.

The nursery industry is a significant sector of the Australian horticultural industry and employs over 45,000 people in more than 20,000 small to medium sized businesses with a combined supply chain market value in excess of \$15 billion annually. It is important to note that the industry is far broader than the perceived 'ornamental' market, with businesses involved in large scale forestry, nurseries, medicinal products, flowers, alcohol production, revegetation for mining, landscaping and starter plants for fruit and vegetable production. Table 1 shows the wide range of end users supported by the nursery industry.

**Table 1: National value of horticultural sectors supplied by production nurseries.**

<b>Production Nursery</b>	<b>Horticultural markets</b>	<b>Economic Value</b>
Container stock <sup>1</sup>	Ornamental/urban horticulture	\$2 billion retail value
Foliage plants <sup>1</sup>	Indoor display/hire	\$87 million industry
Seedling stock <sup>2</sup>	Vegetable growers	\$3.3 billion industry
Native and exotic forestry stock <sup>3</sup>	Plantation timber	\$1.7 billion industry
Fruit and nut tree stock <sup>2</sup>	Orchardists (citrus, mango, etc)	\$5.2 billion industry
Landscape stock <sup>1</sup>	Domestic & commercial projects	\$2 billion industry
Plug and tube stock <sup>2</sup>	Cut flower growers	\$700 million industry
Revegetation stock <sup>1</sup>	Farmers, Government, Landcare	\$109 million industry
Mine site revegetation	Mine site rehabilitation	Value unknown
<b>Total Economic Value</b>		<b>\$15.0 billion</b>

<sup>1</sup> Freshlogic (2008) Australian Garden Market Monitor for the Year Ending 30 June 2009

<sup>2</sup> Horticulture Australia Limited (2004) Australian Horticultural Statistics Handbook

<sup>3</sup> Australian Bureau of Agricultural and Resource Economics (2008). Australian Forest and Wood Products Statistics

**Submission**

Nursery & Garden Industry Australia (NGIA) welcomes the opportunity to make a submission to the inquiry into the Government's *Direction Action Plan*. This submission provides data in relation to the Green Corridors and Urban Forests component of the Government's *Direct Action Plan* and specifically addresses the following terms of reference:

- i. whether the *Direct Action Plan* has the capacity to deliver greenhouse gas emissions reductions consistent with Australia's fair share of the estimated global emissions

Inquiry into  
The Government's Direction Action Plan

budget that would constrain global warming to Australia's agreed goal of less than 2 degrees,

- ii. whether the *Direct Action Plan* has the capacity to reduce greenhouse gas emissions adequately and cost effectively,
  - iii. the effect of technical issues that arise for measuring abatement under the *Direct Action Plan*, including additionality and establishing emissions baselines for emitting entities and long-term monitoring and reporting arrangements,
  - iv. the repeal of the Clean Energy Package and the *Direct Action Plan*'s impact on, and interaction with, the Carbon Farming Initiative,
  - v. the fiscal and economic impact of the *Direct Action Plan*, and
  - vi. any other related matters.
- i. **Whether the *Direct Action Plan* has the capacity to deliver greenhouse gas emissions reductions consistent with Australia's fair share of the estimated global emissions budget that would constrain global warming to Australia's agreed goal of less than 2 degrees.**

The Government's *Direction Action Plan* commits the Government to the planting of an additional 20 million trees by 2020 in a bid to deliver greenhouse gas emission reductions. A plethora of data exist in relation to the fundamentals of trees being able to remove carbon dioxide from the atmosphere through the natural process of photosynthesis and store the carbon in their biomass including leaves, branches, stems, bark and also roots. Indeed, trees (vegetation), that are recognised as 'permanent plantings' and determined to not be common practice, are already eligible for inclusion in the Carbon Farming Initiative (CFI)<sup>1</sup>. **For the purposes of this submission, the fundamentals of carbon sequestration in tree biomass are assumed knowledge.**

**The *Direct Action Plan* explicitly refers to the planting of trees in both Green Corridors and Urban Forests as opposed to broad acre rural land. This is an extremely important aspect to acknowledge based on the relationship between projected increase in heatwaves as a result of a climate change and the fact that the majority of Australians live in cities**<sup>2</sup>. For the purpose of this submission, Green Corridors refer to expanses of land

---

<sup>1</sup>, Department of the Environment, Australian Government, Permanent plantings - CFI Positive list activity, viewed 8 January 2013, <http://www.climatechange.gov.au/reducing-carbon/carbon-farming-initiative/activities-eligible-and-excluded/positive-list/positive-list-activities/permanent-plantings>.

<sup>2</sup> Department of Infrastructure and Regional Development 2013, State of Australian Cities 2013 Report, viewed 9 January 2013, <http://www.infrastructure.gov.au/infrastructure/pab/soac/>.

Inquiry into  
The Government's Direct Action Plan

that connect habitat, often within urban environments that act as vital linkages for human interaction and movement of wildlife. Urban Forests describe trees and shrubs on public and private land in and around urban areas and are also vital for human interaction and movement. Trees that populate both Green Corridors and Urban Forests are vital in creating resilient, sustainable cities that provide healthy and enjoyable places for people to live, commute and work. Trees in Green Corridors and Urban Forests have the capacity to ameliorate greenhouse gas emissions directly through carbon storage and sequestration and indirectly by alleviating impacts of the Urban Heat Island Effect (UHIE).

The phenomena of the UHIE, whereby urban areas become warmer than the surrounding rural countryside, often by several degrees, presents cause for concern in urban areas Australia<sup>2</sup>. The UHIE is a result of large expanses of heat-absorbing materials such as dark coloured pavements and roofs, concrete and urban canyons that trap and retain hot air. This phenomenon is potentially deadly for city dwellers as heat stress associated with elevated temperatures is linked to higher rates of human mortality and illness, particularly amongst vulnerable demographics such as: the elderly; lower socio-economic classes; and residents in high density, older housing stock with limited surrounding vegetation. Major heatwaves are Australia's deadliest natural hazards and are predicted to increase in frequency, geographic spread and duration with predicted climate change. Moreover, as Australia's population ages, heat vulnerability is expected to also increase<sup>2</sup>.

**A key aspect to highlight when considering the role of trees in greenhouse gas emission reduction are the plethora of indirect benefits aside from carbon sequestration, namely the role of trees in mitigating the phenomena of the Urban Heat Island Effect (UHIE).** Trees have been shown to mitigate the impacts of the UHIE by providing shade in summer, thus reducing the absorption of heat by hard surfaces as well as cooling the air by a process known as transpiration whereby water within a plant is lost as water vapour from the leaf surface. This in turn cools the surrounding air and acts as a natural air conditioner. Recently, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) evaluated the influence of urban vegetation in cooling Melbourne's Central Business District (CBD) and reported that urban vegetation can reduce temperatures in cities by 0.3°C up to 2°C. More importantly, CSIRO predicted that increasing urban vegetation in the Melbourne CBD region can reduce heat stress and resulting mortalities by 20-60%<sup>3</sup>.

---

<sup>3</sup> Chen, D. (2013) Urban Vegetation and Heat Related Mortality, Nursery Papers, April, Issue 3, [http://ngia.com.au/Folder?Action=Download&Folder\\_id=105&File=NGIA\\_NP\\_2012-05.pdf](http://ngia.com.au/Folder?Action=Download&Folder_id=105&File=NGIA_NP_2012-05.pdf) and Chen, D. (2012) Mitigating

Inquiry into  
The Government's Direction Action Plan

Furthermore, trees in Australia's Green Corridors and Urban Forests can lower air temperatures and wind speeds which in turn can reduce cooling costs and peak energy demand and result in reduced greenhouse gas emissions from power plants. A summary of this is presented below in Table 2 and estimates the 1.25 million tonnes of carbon is stored in 100,000 large mature urban trees and a further 3,600 tonnes of carbon is saved as a result of indirect energy savings associated from less air-conditioned dwellings during summer months and reduced gas use for heating in winter months. If you extrapolate these figures to 20 million large mature urban trees, this would amount to 250 million tonnes of stored carbon and a further 720,000 tonnes of carbon saved as a result of indirect energy savings.

**Table 2. Estimates of various environmental economic values for 100,000 large mature urban trees growing in an Australian city (modified from Moore 2009b<sup>4</sup>).**

Parameter	Value per Tree	Quantity	Unit Price AUD \$	Value AUD \$	Reference
Carbon sequestered in trees	12.5 tonne	1.25 million	\$23 per tonne	\$28.75 million	Moore 2009b <sup>5</sup>
Street tree value	\$200 AUD per annum	-	\$20 million per annum	-	Killicoat et al. 2002 <sup>5</sup>
Electricity saving	30 kWh	3 million kWh	\$0.17 per kWh	\$510,000 per annum	Fisher 2007 <sup>6</sup>
Carbon emissions saved	1.2 kg for each kWh	3,600 tonne	\$23 per tonne	\$82,800 per annum	Moore 2009b <sup>5</sup>

Notes on estimations and calculations:

- i. the estimate of 12.5 tonne is for a large mature urban tree.
- ii. the price of AUD \$23 per tonne is based on the Australian carbon market price (when the research was conducted).
- iii. the electricity saving is based on reduced energy use due to shade from trees.
- iv. the price used for electricity is based on a rounded Victorian rate per kWh.

---

Extreme Summer Temperatures with Vegetation, Nursery Papers, June, Issue 5  
[http://ngia.com.au/Folder?Action=Download&Folder\\_id=105&File=NGIA\\_NP\\_2012-05.pdf](http://ngia.com.au/Folder?Action=Download&Folder_id=105&File=NGIA_NP_2012-05.pdf).

<sup>4</sup> Moore G M (2009b) *Urban Trees: Worth More Than They Cost* Lawry D, J Gardner and S Smith Editors, Proceedings of the Tenth National Street Tree Symposium, 7-14, University of Adelaide/Waite Arboretum, Adelaide, ISBN 978-0-9805572-2-0

<sup>5</sup> Killicoat, P, Puzio, E, and Stringer, R (2002), *The Economic Value of Trees in Urban Areas: Estimating the Benefits of Adelaide's Street Trees*. Proceedings Treenet Symposium, 94-106, University of Adelaide.

<sup>6</sup> Fisher P (2009) *Why We need the Urban Forest*. Urban Magazine, July 2007

Inquiry into  
The Government's Direct Action Plan

- ii. **Whether the *Direct Action Plan* has the capacity to reduce greenhouse gas emissions adequately and cost effectively,**

**The ability of trees in in Green Corridors and Urban Forests to reduce greenhouse gas emissions adequately and cost effectively is largely dependent on a number of parameters including the tree species (i.e life span, growth rate, and the size of the resulting tree canopy), location of planting (i.e. proximity to buildings) and required maintenance to ensure success of planting in the landscape.** Careful consideration is required to determine the type of trees and location for planting of the additional 20 million trees by 2020. The *Direct Action Plan* suggests that tree-planting may be potentially conducted by the Green Army in cooperation with other local conservation, environmental, and community organisations, which we suggest will enhance the return on investment. It is important to note that **carbon mitigation is but one element of incorporating trees in the landscape** and the co-benefits of planting trees in urban areas are substantial. These relate to trees reducing air and water pollution, effective storm water and run off management; increasing aesthetics, reducing crime, increasing property values, and mitigating heat-islands.

A recent study of planting street trees in New York, America reported the cost per ton of carbon abated from planting trees near buildings for a 100 year planning horizon ranged from \$3,133 per tonnes of carbon for a London plane tree to \$8,888 per tonnes of carbon for a Callery pear tree. The London plane tree was found to be the most cost-effective species because of its long life span and large canopy, however varied across planting locations<sup>7</sup>. Another study in Colorado America which examined the cost efficiency of urban tree planting showed the marginal costs of carbon for neighborhood tree planting ranged from \$145 per tonnes of carbon in Denver to \$647 per tonnes of carbon in Fort Collins<sup>8</sup>. Again, this study highlighted the disparity between costs attributed to planting locations.

- iii. **The effect of technical issues that arise for measuring abatement under the *Direct Action Plan*, including additionality and establishing emissions baselines for emitting entities and long-term monitoring and reporting arrangements,**

---

<sup>7</sup> Kent F. Kovacs, Robert G. Haight, Suhyun Jung, Dexter H. Locke, Jarlath O'Neil-Dunne, 2013. The marginal cost of carbon abatement from planting street trees in New York City, *Ecological Economics*, Volume 95, Pages 1-10, ISSN 0921-8009, <http://dx.doi.org/10.1016/j.ecolecon.2013.08.012>.

<sup>8</sup> Melissa R. McHale, E. Gregory McPherson, Ingrid C. Burke, 2007. The potential of urban tree plantings to be cost effective in carbon credit markets, *Urban Forestry & Urban Greening*, Volume 6, Issue 1, Pages 49-60, ISSN 1618-8667, <http://dx.doi.org/10.1016/j.ufug.2007.01.001>.

Inquiry into  
The Government's Direction Action Plan

**Measuring carbon abatement of trees in Green Corridors and Urban Forests can be undertaken using a free-to-use software suite known as i-Tree Eco.**

This peer-reviewed software suite was developed by the Centre for Urban Forest Research unit of the United States Department of Agriculture (USDA) to provide a dollar value for the environmental benefits created by Urban Forests, including the amount of carbon sequestered and stored in urban trees. The software suite is designed to use field data from complete inventories or randomly located sample plots. It can also be used to determine the percent of canopy cover at any a given location based on Google Map technology.

The i-Tree Eco program has become widely used in local governments across Australia. For example, the City of Melbourne<sup>9</sup> used i-Tree to assess 982 trees in Royal Parade, Collins Street, Swanston Street, Lonsdale Street and Victoria Parade and reported that the trees measured:

- store 838 metric tonnes of carbon at a dollar value of \$19,100
- sequester 24 metric tonnes of carbon each year at a value of \$548 per year
- save \$6,370 in energy costs each year through shading buildings in summer and providing solar access in winter
- avoid carbon emissions by reducing energy use by \$114 per year
- remove 0.5 metric tonnes of air pollution per year at a dollar benefit of \$3,820
- have a structural value (replacement cost) of approximately \$10.4 million.

City of Melbourne has developed an Urban Forest Strategy 2012-2032 which proposes to mitigate the UHIE by increasing tree canopy cover from 22% to 40% by 2040. The City of Sydney has also developed an Urban Forest Strategy and proposes to mitigate the UHIE by increasing the average total canopy cover from the current 15.5% to 23.25% by 2030, and then to 27.13% by 2050, through targeted tree planting programs located in streets, parks and private property. It is evidenced by these strategies that local governments have the capacity to increase urban plantings and measure their impacts using science based peer-reviewed resources such as i-Tree Eco.

i-Tree Eco has been used extensively in cities across the world to assess carbon abatement as well as other environmental benefits. Cities that have used i-Tree include: Atlanta, GA; Baltimore, MD; Baltimore County, MD; Beijing, China; Boston, MA; Brooklyn, NY; Calgary, Alberta; Casper, WY; Chicago, IL; Freehold, NJ; Florence, Italy; Fresno, CA; Fuenlabrada,

---

<sup>9</sup> City of Melbourne Urban Forest Strategy 2012-2032  
<https://www.melbourne.vic.gov.au/Sustainability/UrbanForest/Pages/About.aspx>

Inquiry into  
The Government's Direct Action Plan

Spain; Gainesville, FL; Greenville-Spartanburg, SC; Golden, CO; Halifax, Nova Scotia; Hartford, CT; Houston, TX; Hefei, China; Indiana (state assessment); Jersey City, NJ; Kelowna, British Columbia; Kennedy Meadows, CA; Kent, OH; Los Angeles, CA; Miami, FL; Milan, Italy; Minneapolis, MN; Moorestown, NJ; Morgantown, WV; Nebraska City, NE; New York, NY; Ningbo, China; Oakville, ON; Petrozavodsk, Russia; Philadelphia, PA; Piazzola, Italy (street trees); Porto Alegre, Brazil (parks); Prince Williams Forest, VA; San Francisco, CA; San Juan, PR, Santiago, Chile; Scranton, PA; Syracuse, NY; Tampa Bay, FL; Tennessee (state assessment); Toronto, Ontario (and 7 suburbs); Visalia, CA; Washington, DC; Wilmington, DE; Wisconsin (state assessment); and Woodbridge, NJ.

**iv. The repeal of the Clean Energy Package and the *Direct Action Plan*'s impact on, and interaction with, the Carbon Farming Initiative,**

At present, the Carbon Farming Initiative (CFI) recognises the planting of trees in green Corridors and Urban Forests (referred to as 'landscape plantings') as regular activity and therefore considered "common practice" and excluded from the CFI positive list. The CFI also requires projects to be subject to a 100-year permanence obligation.

Landscape plantings are defined as plantings in an urban centre or locality as follows:

- (a) in a residential place (for example, in a backyard, park or on a nature strip);
- (b) on the grounds of a sporting facility, factory or other commercial facility;
- (c) on the grounds of a hospital, school or other institution;
- (d) in a car park or cemetery.

Urban centres are defined by the Australian Bureau of Statistics as population clusters of 1,000 or more people with a density of at least 200 km<sup>2</sup>. A locality is described as containing a non-farm population of 200 - 999 people, with a minimum of 40 occupied non-farm dwellings with a discernible urban street pattern and a discernible nucleus of population.

**Green Corridors and Urban Forests should be considered for inclusion on the positive list under the CFI** due to their ability to contribute significant carbon sinks to meet Australian emission reduction targets. Looked at from the city scape perspective the Urban Forest in Australia is the largest managed forestry asset, and one which is generally protected from the impact of bushfire. In America, it is reported that the total tree carbon storage in urban areas *circa* 2005 was estimated at 643 million tonnes of carbon in addition to the annual

Inquiry into  
The Government's Direction Action Plan

carbon sequestration estimated at 25.6 million tonnes of carbon per year<sup>10</sup>. Compounding this further is that trees in Green Corridors and Urban Forests are not recognised under the Kyoto Protocol as either sinks or for purposes of sequestration, primarily because of difficulties that relate to verification of data, and the relatively small scale of individual urban plantings. Future consideration should be directed in developing a mechanism to allow the quantification of carbon in Urban Forests managed by local governments under the CFI.

**v. The fiscal and economic impact of the *Direct Action Plan*,**

According to the *Direct Action Plan*, the Green Corridors and Urban Forests component is budgeted at \$50 million dollars over four years. This equates to \$2.50 per tree planted. It is unclear how this \$50 million will be allocated in terms of operational costs, plant procurement, establishment and maintenance costs. **Although this budget is feasible and will allow the planting of 20 million trees, we believe that additional funds should be allocated to this component to ensure long terms success.** What we mean by this is the purchasing of established tree stock and investment into adequate planting sites along with provisions to ensure the long term success of the landscape.

**vi. Any other related matters.**

**The Green Corridors and Urban Forests component of the *Direct Action Plan* directly supports the 202020 vision ([www.202020vision.com.au](http://www.202020vision.com.au)) to increase Australian urban green space by 20% by 2020.** This collaborative project brings together partners across government, community and business sectors in order to champion this initiative. Some of the organisations that support this campaign include:

- Councils and State Governments - e.g. City of Melbourne, NSW Government
- Developers and asset managers - e.g. Brookfield Multiplex and Frasers
- Community and non for profits - e.g. Green Building Council, Royal Botanical Gardens and small grass roots organisations like Touched by Olivia Foundation which aims to provide inclusive playgrounds
- Commercial/business sector - e.g. BUPA, Go Get and Medibank Private,

These organisations have committed to support the 202020 Vision and are leading the way in creating a sustainable future.

---

<sup>10</sup> David J. Nowak, Eric J. Greenfield, Robert E. Hoehn, Elizabeth Lapoint, 2013. Carbon storage and sequestration by trees in urban and community areas of the United States, Environmental Pollution, Volume 178, Pages 229-236, ISSN 0269-7491, <http://dx.doi.org/10.1016/j.envpol.2013.03.019>.

Inquiry into  
The Government's Direct Action Plan

We note that the Government has also released the Emissions Reduction Fund Green Paper outlining their preferred design options for the Emissions Reduction Fund. We note that this Green Paper states that the Emissions Reduction Fund is designed to complement activities listed within the Direct Action Plan, however indicates that it supports the expansion of emissions reduction activities such as tree planting or revegetation. We support this expansion, particularly in relation to the contribution of trees and vegetation in the Urban Forest and Green Corridors. We note that the Emissions Reduction Fund Green Paper also discusses introducing a 25-year permanence option for sequestration projects. We fully support both this reduction from the current 100-year permanence obligation, and expect that due consideration be given to the contribution of Urban Forests in future opportunities with the CFI.

Nursery & Garden Industry Australia is willing to provide further information upon request.

---

Robert Prince  
**Chief Executive Officer**  
Nursery & Garden Industry Australia  
14/01/2014