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NEWCASTLE INSTITUTE FOR
ENERGY AND RESOURCES



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

Hunter BioValley

A GREEN GROWTH AND INNOVATION
POWERHOUSE FOR AUSTRALIA

International Centre for Balanced Land Use

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Purpose

Whilst the transition away from carbon-intensive activities gathers pace across Australia, relatively little attention has been afforded to where we are transitioning to—what does the future look like; how do we maintain growth, jobs and our way of life; how do we support a resilient and healthy environment?

This document introduces the concept of green innovation as a foundation for sustainable economic renewal in the Hunter Region and across NSW. It sets out a vision for investment in renewable energy, agri-food, green products and design, environmental management and bio-technology to create the first green innovation region in Australia: the Hunter BioValley.

Context

As the push to decarbonise energy systems escalates globally, the Hunter Region will face particular challenges due to its carbon-intensive economy. Policymakers and planners must balance the need to maintain regional prosperity with the need to reduce carbon footprints and environmental degradation. The transition to a low-carbon economy provides the opportunity to set the course for a resource-efficient and sustainable economy that will promote employment and growth in the Region.

In Europe, the imperative to sustain economic growth while preserving the environment has generated substantial investment in green industries and biotechnologies and created a growing strategic focus on several emergent sectors:

- Renewable energy and storage: with a focus on wind (including offshore) and distributed solar
- Bio-innovation: the creation of lucrative bio-economies based on the conversion of biological resources
- Sustainable agri-food: reducing ecological footprint of food chains, improving health outcomes for consumers
- Sustainable built environment and transport systems: addressing impacts of building, city and vehicle design
- Green products and services: energy efficient and low impact consumer products and services
- Environmental remediation and management: ecosystem remediation and renewal-e.g. soil and water science

Two particular features of the European approach to green growth and innovation that set it apart from the

Circular Economy

In a circular economy, materials are not destroyed at the end of their life, but are used to make new products over and over again. It involves "closing the loop" of product lifecycles through greater recycling and re-use.

McKinsey estimates that the global value of resource efficiency could eventually reach \$3.7 trillion per year by 2030 and circular policies can lead to savings of 290 to 485 billion euros in the EU alone.

Circular economy policies have been adopted by the UN, European Union, Finland, UK, France, Japan, China, etc.

Bioeconomy

The bioeconomy is the production of biomass and the conversion of renewable biological resources into value-added products, such as food, bio-based products (e.g. pharmaceuticals, fibres) and bioenergy.

By 2020, the European bio-based economy is projected to have a global market value of €200bn (AUD\$300bn); by 2030, bio-based industries are expected to contribute 3 million extra jobs and an €80bn (AUD\$120bn) increase in turnover (World Economic Forum, 2010). In 2014 in the UK alone, bio-innovation generated over 78,000 jobs and turnover of £23.4bn (AUD\$41bn).

Australian experience have been the focus on the 'circular economy' and the development of a bioeconomy.

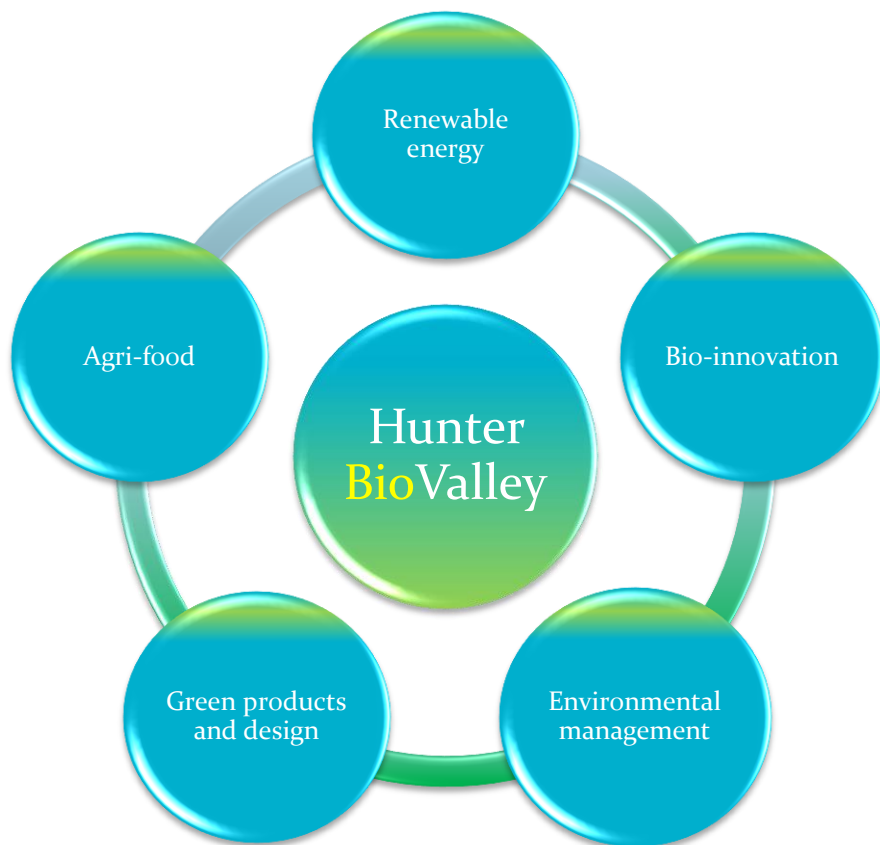


The emergence of these green innovation sectors and the principles of circular, bio-economies can provide a model for transformation of the Hunter economy and the continued prosperity of the region.

Green innovation and the Hunter BioValley

The Hunter Region is ideally placed to benefit from the transformation to a low-carbon future. It has the natural assets, infrastructure, skills and culture to become Australia's green innovation powerhouse, capitalising on the global momentum behind clean energy and biotechnologies to create strong regional growth, long-term employment, healthy environments and a better life for Hunter communities.

Just as California has the high-tech hub 'Silicone Valley', so too could New South Wales include the bio-tech hub of the Hunter BioValley. Drawing on global expertise and experience in transitioning away from carbon-dependent economies, particularly across Europe, the model for the Hunter BioValley could include:



Renewable Energy: centralised and distributed solar generation, wind power, mass storage, and distribution and maintenance

Bio-innovation: utilising the Hunter's strengths in R&D and manufacturing, convert biomass into bioenergy, biochemicals, bio-plastics, etc

Environmental management: opportunities for remediation of industrial and mine sites, water treatment and biodiversity protection

Green products and design: draw on manufacturing base to develop green products, and improve the sustainability of the built environment

Agri-food: building on existing strengths in wine and food, develop a sustainable food chain reputation to drive demand and new investment

The Hunter BioValley would be underpinned by the principles of a circular economy: keeping resources in use for as long as possible, extracting the maximum value from them whilst in use, then recovering and regenerating products and materials at the end of each service life. Material and energy loops would be closed where possible so that valuable materials and products are used efficiently and re-used effectively, whilst using renewable energy to produce and transport them.



The Hunter BioValley would create a more innovative and low-emissions economy, reconciling demands for sustainable agriculture and fisheries, food security, and the sustainable use of renewable biological resources for industrial purposes, while ensuring biodiversity, environmental protection and community well-being.

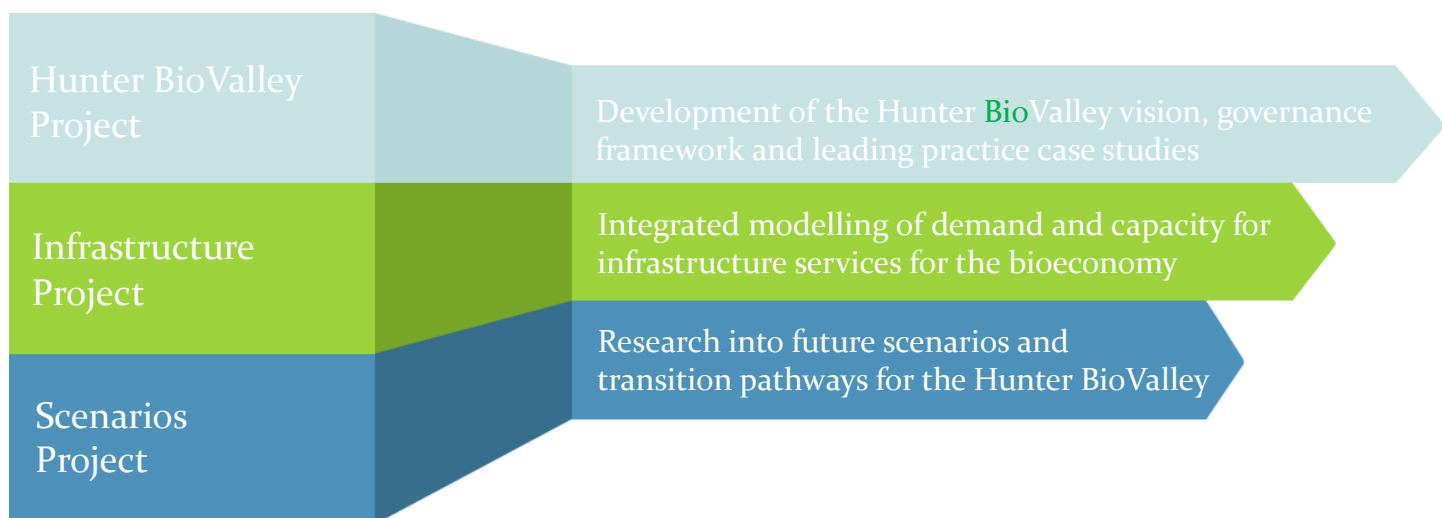
Governance approach

The development of the Hunter BioValley will require coordinated engagement by government, the community and business stakeholders to:

1. Identify key green growth sectors for the Hunter BioValley;
2. Support innovation and innovation clusters that link R&D to early stage deployment in the key green growth sectors;
3. Enable infrastructure, through public policy and planning, to provide the framework for business growth and 'living laboratories' for new technologies and business models;
4. Facilitate capital deepening, and domestic and foreign investment, to support local competitiveness and long-term employment in the Hunter Region.

Foundation Projects

We are currently seeking partnerships with local and state governments to deliver against regional commitments of the Hunter Regional Plan 2036 and the Upper Hunter Economic Diversification Action Plan. Three foundation projects have been developed that will provide an evidence-based approach to support the implementation of the Hunter Regional Plan 2036 and position the Upper Hunter as Australia's regional model for a circular bio-economy. The Hunter BioValley concept is part of a linked programme on optimised land-use and sustainable development that design new approaches for better use of land resources, resulting in enhanced prosperity for local communities and the development of new markets and export-oriented industries. The foundation project will be implemented in collaboration with our international research and institutional partners.





PROJECT ONE: HUNTER BIOVALLEY PROJECT

The Hunter BioValley Project will establish the overarching vision for the development of the circular bioeconomy in the Hunter. The project involves:

- Trans-disciplinary research on green innovation, circular economy and bio-economy models
- Engagement with key regional and national stakeholders to identify institutional gaps and the need for policy;
- Development of case studies from across the globe to demonstrate investment, partnership and enterprise opportunities for the Hunter BioValley

The Hunter BioValley project will create a roadmap for the transformation of the Hunter economy and provide decision makers with policy guidance for the implementation of green innovation in the Hunter Region.

PROJECT TWO: REGIONAL INFRASTRUCTURE PROJECT

Whole-systems technical research into the infrastructure capabilities and requirements of the Hunter Region through:

- modelling the energy, water, logistics and agriculture infrastructure capacities of the Hunter
- creating an engineering-based simulation model of the future demand for infrastructure in the Hunter BioValley through GISMOD (Green Infrastructure Services Model), a modelling program that will be developed in partnership with Oxford University's Infrastructure Transitions Research Consortium

This project will create an **infrastructure blueprint** for the Hunter BioValley, enabling policy makers and planners to systematically manage the development of the green growth cluster. This **infrastructure blueprint** will provide greater certainty for global investors looking to establish industry and technology enterprises within the Hunter BioValley.

PROJECT THREE: BIOECONOMY SCENARIOS PROJECT

This project will establish future scenarios for the Hunter BioValley identifying potential areas of innovation, industrial sectors and new markets to promote green growth. The project will involve:

- collaborative scenario development with regional stakeholders and global experts
- developing the transition pathways to realising those scenarios
- creating a master plan for optimising the economic, social and environmental benefits of the transformation to the Hunter BioValley

This project will enable decision makers to 'lead from the future' – goals and future regional settings will be crafted in consultation with stakeholders and experts which will create 'pull' factors for action on green growth and innovation.



Brief introduction to case studies

1. Yorkshire UK - Biovale

A fundamental change is underway in the way in which energy is generated and managed in the UK, from a relatively simple traditional centralised energy network utilising carbon-intensive assets to a much more complex and dynamic system based on a decentralised, low-carbon generation network. In Yorkshire, the broader shift away from fossil fuels, and the conversion of power stations from coal to biomass, has been accompanied by the development of a low-carbon – green innovation industrial zone. With the vision to turn the regional economy into a bioeconomy, the Biorenewable Development Centre has been set up to catalyse efforts, research and investment in the pursuit of greener approaches to economic growth. Working with over 200 businesses on more than 350 projects, the Biorenewable Development Centre is helping public and private sector partners to develop new products and build new supply chains using biomass and wastes as raw materials, using extensive expertise at the University of York in green chemistry and industrial biotechnologies.

2. Finland – Roadmap to a Circular Economy 2016-2025

In Finland, government support and investment has been directed at shifting industry and municipalities toward a sustainable future. Research & Development is facilitated by clear long-term government policies backed by legislation, along with strong centres of excellence at universities around the country. With the support of SITRA (The Finnish Innovation Fund), the Finnish Government has recently released its road map to a circular economy outlining the opportunities to create a sustainable, carbon-neutral, circular economy over the next 5 to 10 years. The Finnish Government's strategy is based on the premise that economic growth and increased well-being are no longer dependent on the wasteful use of natural resources and the carbon cycle, as the circular economy can maximise the use of materials and retains their value in the loop for as long as possible. The roadmap to a circular economy 2016-2025 brings together a large number of outstanding pilots, including: an initiative to recover waste heat; Central Finland's investment in the use of biogas for transport; Helsinki Region's plans to switch to high-blend biofuels; a joint VTT and Aalto University research project on new cellulose-based materials; plans in the Lappeenranta region to switch from using imported fossil fuels to domestic renewable energy for its transport needs; City of Turku plans to pilot a zero-waste region; a joint forestry sector and Tekes project for the utilisation of forestry by-products.

3. Italy – Novamont / Matrica

Novamont is an innovative company that fosters the development of a bioeconomy model based on the efficient use of resources and the regeneration of regional areas. By restoring industrial sites that are decommissioned or are no longer competitive, Novamont sets up biorefineries integrated in the local areas to make high value added products with low environmental impact and create new jobs.



The following are the cornerstones that distinguish our **bioeconomy model**:



Reconversion of industrial sites that are decommissioned or are no longer competitive to create innovative biorefineries integrated in the local areas, transforming local problems into development opportunities.



Promotion of a circular economy rethinking the traditional model of production-consumption-disposal of products with a system-based approach, that is, starting with renewable raw materials to produce manufactured goods which at the end of their lives will be converted into a new resource.



Creation of bridges and interconnections between sectors, to incentivise cooperation and synergies between various stakeholders towards common objectives, starting with the profitable utilisation of the specific nature of the local areas.

One interesting case study is Matrìca, a 50:50 joint venture between Versalis (ENI), the leading Italian manufacturer of petrochemical products, and Novamont. Matrìca was established as an integrated, third-generation biorefinery in Sardinia that will produce a range of bio-products (for use in numerous sectors, bio-plastics, bio-lubricants, home and personal care products, plant protection, additives for the rubber and plastics industries, food fragrances, etc.), through processes that have low levels of environmental impact. Based on the use of agricultural raw materials and vegetable waste, Matrìca showcase a new developmental model based on continuous innovation, the leveraging of local biodiversity and strong collaboration with farmers, researchers and institutions. It is a model for local regeneration in economic, environmental and social terms, making the most of existing local resources and skills, with a positive impact on long-term employment prospects. Once complete, by 2017, the project will encompass an area of around 27 hectares, with various plants contributing towards the total capacity of around 350,000 tonnes of bio-products per year.

4. France, a strategy of ecological transition towards sustainable development 2015-2020

France has developed a comprehensive policy and legislative framework to reconcile its goal of transforming its energy system with achieving green growth and job creation. In 2015, the Parliament adopted a law on the energy transition for green growth. The Act lays out a comprehensive and ambitious roadmap for transforming France's energy system and tackling unemployment through green growth, the development of new technologies and markets in the fields of renewable energies, clean transport and energy efficiency. The Act seeks to enhance France's energy autonomy, cut its greenhouse gas emissions and stimulate green growth by promoting activity in the construction, renewables and clean transport sectors and the development of circular economies. The Act will also have a social component including a "zero waste" target and fuel poverty prevention.



Project structure

A three-staged approach will support the development and implementation of the vision for a bioeconomy in the Hunter Region. This will be achieved in alignment with the priorities articulated in the Hunter 2036 Plan for the diversification of the economy.

A. Short term: Identify and document best practices from key sites / regions that have successfully developed a bioeconomy. This stage of our approach will also identify and analyse recent policy and regulatory developments to foster socially inclusive green economies, and the policy frameworks that have been conducive to green growth, in selected Australian and foreign jurisdictions

B. Medium term: Develop a regional bioeconomy road map for the Hunter Region in collaboration with our research and institutional partners in Australia and overseas. This stage will include an assessment of the Hunter Region's conditions, the specific barriers that would affect the market for green innovation in NSW, accessibility of biomasses, and the potential for integrated agro-industrial supply chains.

C. Long term: Pilot-scale initiatives embedded /aligned with the road map for the Hunter Region, using best practice case studies. This stage will also be supported by an integrated education, training and research programme to support a strong bioeconomy competence base.

Period	Activities / Focus	Partners
Short term: Nov 2017- May 2018	Identify and document best practices from key sites/ regions that have successfully developed a bioeconomy.	ICBLU, DPC, DRIFT.
Medium term: June 2018- April 2019	Develop a regional bioeconomy road map for the Hunter Region in collaboration with our research and institutional partners in Australia and overseas	ICBLU, DPC, DPI, DRIFT.
Long term: April 2019 – ongoing	Pilot-scale initiatives embedded /aligned with the road map for the Hunter Region, using best practice case studies	ICBLU, DPC, DRIFT, Oxford University, Wuppertal Institute.



International Centre for Balanced Land Use

ICBLU has the expertise and partnerships to become a key network hub in the development of the Hunter BioValley. Universities have played a key role in sustainability transitions to new economies across the globe, linking industry, governments and communities in efforts to address environmental issues whilst maintaining economic growth.

ICBLU brings together researchers from engineering, earth sciences, mathematics, geography, economics, business, law and social science to deliver a multi-disciplinary platform for research into regional transformation and development. ICBLU draws on its international network of experts from the UK, Germany, The Netherlands, Sweden and China to learn from the experiences and capabilities of world-class researchers in regions well-advanced in green growth and innovation initiatives.