DRAFT FOR DISCUSSION

QUEENSLAND RESOURCE RECOVERY INDUSTRIES

10-YEAR ROADMAP AND ACTION PLAN
Foreword

We’re committed to supporting new and innovative solutions to our collective waste challenge and ensuring the correct incentives are in place to drive investment into resource recovery industries.

Our aim is to make Queensland a world leader in projects involving resource recovery, recycling and the remanufacturing of materials and to support our long-term vision to attract investment, develop new industries and grow jobs.

Broad and diverse, resource recovery industries impact many sectors. The supply chain commences with the design of products and, following initial use, continues through collection and sorting processes, to the re-use, recycling and recovery of waste as a resource.

Part of a suite of wider government activities, the Resource Recovery Industries 10-Year Roadmap and Action Plan (the Roadmap) is another demonstration of the Queensland Government supporting investment through reducing waste going to landfill, and another leap forward in our journey towards a zero-waste future.

A key action under the draft Waste Management and Resource Recovery Strategy, the Roadmap sets out a plan for supporting industry growth and job creation in resource recovery industries over the next 10 years.

Economically, we know that by supporting resource recovery industries to grow, new jobs will be generated for our communities and businesses can confidently invest in Queensland. By encouraging investment and innovation in the waste industry we’ll also deliver long-term environmental benefits.

The recently launched $100 million Resource Recovery Industry Development Program (RRIDP) is a complementary initiative to the Roadmap and acts to accelerate the growth of resource recovery industries that increase recycling activities, divert waste from landfill and reduce stockpiling in Queensland.

The RRIDP and other targeted incentives will ensure Queensland attracts industry investment to support ongoing economic growth, the creation of new jobs, and upskilling opportunities for the workforce, as well as building capacity and new markets in regional areas of Queensland.

As our government looks to build a sustainable economy, initiatives like this not only support the development of new industries, they support Queensland investment and jobs by creating new products from waste, growing industry and reducing the impact on our environment.

The Hon. Cameron Dick MP
Minister for State Development, Manufacturing, Infrastructure and Planning
Growing Queensland’s resource recovery industries

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The ongoing development of markets for recycled and repurposed material through investment in modern efficient facilities and processes will reduce the amount of waste going to landfill and will assist Queensland to become a zero-waste society.

Working closely with industry and other stakeholders, we’ve developed a series of roadmaps focused on emerging priority sectors with global growth potential. The Resource Recovery Industries 10-Year Roadmap and Action Plan (the Roadmap) is a key action under our Waste Management and Resource Recovery Strategy (Waste Strategy).

The Roadmap provides industry and other stakeholders with an overview of our plan to expand and enhance this established industry sector, and support new technologies for it to grow. It will guide the sustainable growth and development of Queensland’s resource recovery industries by facilitating investment and market-capacity building and coordinating appropriate land-use planning frameworks to realise the economic opportunity the Waste Strategy presents.

These actions will provide business and industry with the confidence to invest in Queensland, creating new jobs, providing upskilling opportunities for the workforce, and building capacity and new markets in regional areas of the state.

Delivery of the Resource Recovery Industries 10-Year Roadmap and Action Plan will be led by the Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP). Actions proposed in the Roadmap will align with the Waste Strategy to ensure economies of scale and a whole-of-government approach to growing the waste and resource recovery sector, attracting industry investment, supporting jobs growth and regional development opportunities, and diverting waste from landfill.

In financial year (FY) 2018, 55 per cent of waste was sent to landfill and 45 per cent of waste was recovered for other uses.

Resource recovery industries: Our vision

Our vision is for a sustainable resource recovery industry sector that provides measurable economic and environmental benefits to the Queensland economy, creates new jobs, provides upskilling opportunities for the workforce and builds capacity and new markets in regional areas of Queensland.
We’re committed to supporting resource recovery industries to meet the waste avoidance and recovery targets set by the Waste Strategy.

The Waste Strategy will provide a comprehensive and coordinated framework to deliver on the principles of the circular economy. This includes actions to avoid waste and to assist with long-term, sustained growth in the recycling and resource recovery sector to help retain the value of materials in the economy for as long as possible. It will do this by promoting more sustainable waste management practices for business, industry and households in concert with the establishment of a progressive and stable policy and regulatory framework, including the introduction of a waste disposal levy to provide the funding framework to implement the Waste Strategy, and to act as a disincentive for trans-state dumping practices.
Resource recovery industries in Queensland

Resource recovery is the general term for the process of collecting useful wastes and end-of-life materials so they’re available as an input to create valuable products as new outputs.

Resource recovery industries encompass the full waste supply chain, from collection and transfer to sorting, remanufacturing and the production of EfW.

Current resource recovery industries environment

In Queensland, the most common facilities undertaking resource recovery activities are composting facilities for organics (mostly open windrow), material recycling facilities (MRF) for specific recyclable materials; and construction and demolition waste processing facilities. There are discrete facilities using technologies such as anaerobic digestion, mechanical-biological treatment (MBT) and thermal waste-to-energy processes but these aren’t widespread.

We're actively looking for opportunities to support new resource recovery sector projects through programs such as the RRIDP and industry development activities. Government will support industry to overcome some of the typical barriers encountered by emerging or new technologies, including access to funding, business case development, commercialisation partnerships and the de-risking of projects.

Development of new resource recovery facilities generally requires a long-term perspective. In addition to feedstock supply, it needs to consider integration with land-use planning, land development (particularly industrial
Resource recovery: when energy, a material or a product is taken from waste and re-used (Resource Recovery Grants Fund Guidelines).

land development), transport planning and adherence to environmental regulations and policy.

The development pathway for new facilities varies according to the facility type, scale and location. However, it can run over several years as activities related to business case development, procurement and approvals are undertaken. These include market supply and demand studies, planning approvals, securing a suitable site, finding investment partners, contract tendering, and facility design and construction.

Some of the more advanced processing facilities represent significant capital investments and are only cost-effective where large volumes of feedstock are available, making them more challenging to implement in regional Queensland.

By working to ensure the rapid establishment of investment-ready projects in Queensland, new jobs will be created, upskilling opportunities for the workforce will occur, and new markets in regional Queensland will be realised.

Resource recovery actions can extend the life of existing landfills and reduce the need for new landfills while also helping to maximise the value from waste materials. Resource recovery delays the need to use raw materials in the manufacturing process as quality recovered materials can be used as an input substitute.
Resource recovery includes energy recovery from waste, although recycling and re-use options are preferred. It excludes options that recover no value from waste, such as incineration.

Some waste types are more valuable and suitable for recovery than others and can move across regional boundaries. For example, higher-value materials such as recyclable packaging, scrap metals and waste oils will be transported to facilities where they can be reprocessed or exported for reprocessing. Although a recovered paper mill operates in Brisbane, much of Queensland’s paper and cardboard (PAC) waste and plastic waste is exported interstate or internationally for reprocessing.

Besides price, other drivers for interstate or international waste transfer include the availability of specialist resource recovery or remanufacturing facilities, regulations, landfill acceptance criteria and landfill gate specifications.

Recovered organic waste product, such as compost, and recycled waste from built environment activities is mostly processed and utilised closer to the source of generation. This is due to the high costs of transporting these waste materials, relative to the value of the material.

WASTE HIERARCHY

The waste hierarchy framework guides the order of preference for managing waste. It prioritises in this order: the avoidance of unnecessary resource consumption; the reduction of waste generation and disposal; the re-use of waste resources without further manufacturing; the recycling of waste resources to make the same or different products; the recovery of waste resources including the recovery of energy; the treatment of waste prior to disposal, including the reduction of the hazardous nature of waste; and finally, the disposal of waste, only if there’s no viable alternative.

Source: Waste Reduction and Recycling Act 2011 (Qld), section 9
In the current linear take-make-use-dispose model of waste management, waste that’s not recovered is generally sent to landfill close to the source of generation, often within the local government area where it was generated. However, there are instances in Queensland where waste must be transported to other regions for disposal, usually when there’s no available disposal facility in the local council area.

Waste will follow the path of least cost, and for many materials that leads to landfill.

Historically, Queensland hasn’t had strong or stable policy drivers in place to drive resource recovery or discourage landfillsing of waste. This position has led to a significant discrepancy between waste policy and outcomes in Queensland and other mainland states. It has also resulted in market conditions that haven’t supported the development of facilities to reprocess waste materials or remanufacture from recovered resources.

Although EfW is a lower priority on the waste hierarchy, proven technological processes can provide a viable alternative to landfill and stockpiling of wastes that can’t be viably recycled or re-used, and can generate attractive co-location opportunities.

Fortunately, Queensland is a leader in biofuels and bioenergy production and is home to several biomass energy facilities fuelled by bagasse as well as ethanol from sugarcane waste. We’re working to enlarge the emerging biotechnology and bioproducts industry through business development support and funding opportunities. These initiatives are outlined in the Queensland Biofutures 10-Year Roadmap and Action Plan.

There is a natural cross-over between biofuels and resource recovery, particularly in the management of organic waste materials. Current research and projects in the planning phase could potentially see the increased diversion of organic waste from landfill to biofuel and bioenergy projects.
Waste as a resource

Households, businesses, institutions and organisations generate waste. Waste generators are grouped into three major waste streams depending on the source: municipal solid waste (MSW), construction and demolition waste (C&D) and commercial and industrial (C&I) waste.

Municipal solid waste (MSW):
Waste produced primarily by households and collected by on behalf of local councils. It includes other waste generated by local councils such as from public-place bins and council operations.

Commercial and industrial waste (C&I):
Waste produced by institutions and businesses, including industries, restaurants and offices.

Construction and demolition waste (C&D):
Waste generated from building and construction activities, including road and rail construction and excavations.

Putting a higher price on waste materials will incentivise investment in new processes and facilities, stimulate economic activity in the sector, create new jobs, and divert waste from landfill.

The Waste Strategy sets ambitious targets for the achievement of greater resource recovery across each waste stream and set a long-term target of only 10 per cent of total waste generated going to landfill by 2050.

The proportions of different materials contributing to each waste stream will differ, as will the resource recovery potential. For example, most glass waste is generated by households (MSW), while source material in the C&D waste stream is predominantly concrete, brick and soils generated by the building industry.

We've identified three priority wastes: organic waste, waste from built environment activities and plastic waste. These waste types significantly contribute to landfill volumes and environmental impacts while having unrealised recovery potential, and therefore the greatest opportunity to contribute to recycling targets.

### WASTE DIVERTED FROM LANDFILL, TARGETS BY WASTE STREAM

<table>
<thead>
<tr>
<th>WASTE STREAM</th>
<th>MUNICIPAL SOLID WASTE</th>
<th>COMMERCIAL AND INDUSTRIAL WASTE</th>
<th>CONSTRUCTION AND DEMOLITION WASTE</th>
<th>TOTAL</th>
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<tr>
<td>BASELINE</td>
<td>31% FY2018</td>
<td>48% FY2018</td>
<td>51% FY2018</td>
<td>45% FY2018</td>
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<tr>
<td>TARGET</td>
<td>70% 2030</td>
<td>80% 2030</td>
<td>85% 2030</td>
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<td>95% 2050</td>
<td>95% 2050</td>
<td>85% 2050</td>
<td>90% 2050</td>
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Source: (Queensland Waste Strategy – key performance targets, QTC, 2018)

Note: These rates reflect the proportion of waste that’s recycled or recovered, excluding material from which energy is recovered.
CORE WASTE TYPES IN QUEENSLAND

PAPER AND CARDBOARD
Established markets exist in Queensland for recovered paper and cardboard (PAC), although recovery rates need to improve if we’re to meet our recycling targets as set in the Waste Strategy. Despite having a paper mill that exclusively uses recovered fibre feedstock, Queensland has one of the lowest recovery rates across all Australian states and territories. Higher-performing jurisdictions recycle over 75 per cent of PAC waste each year.

Source-separated PAC products are much more valuable as these are easier to recycle. By comparison, paper and cardboard collected in a co-mingled recycling stream must be sent to a material recovery facility (MRF) to be sorted into high, medium and low grades before pulping. Of the PAC waste collected for recycling in Queensland each year, more than half is sent interstate or overseas. Changing global markets and more stringent quality standards on recovered recyclables have significantly impacted the export market for recycled waste materials from Australia, including from Queensland.

GLASS
Most glass waste (74 per cent) is generated by households. Glass recovered in South East Queensland (SEQ) is reprocessed into new products. Outside of SEQ, glass is increasingly being reprocessed into secondary sand products used in road construction or as bedding sand.

While glass waste isn’t a major contributor to the total waste generated in Queensland, more effective collection processes and less contamination will ensure improved recovery rates.

BUILT ENVIRONMENT WASTE (PRIORITY WASTE)
In Queensland, built environment waste comes from major commercial or residential developments, road and transport projects undertaken by or for state or local government, and small-scale home or commercial construction and renovation.

Built environment waste comprises waste types such as concrete, bricks, rubble, contaminated soil, timber, plasterboard and asbestos-related materials. Most source material in the C&D waste stream’s generated by the building industry. At 5.3 million tonnes in FY2018, C&D is the largest waste stream in Queensland, representing around 49 per cent of total waste generated.

It’s also one of the easier streams to recycle. There is strong market demand for clean, recycled concrete aggregates, especially in SEQ, as major contractors and government seek to meet their sustainability targets. The introduction of the Waste Levy will encourage greater investment in reprocessing facilities and equipment in SEQ. However, challenges will remain for regional areas with smaller scale building and construction activity.

Built environment waste types will either be pre-sorted (separated at source) or collected in mixed loads e.g. skip bins. Mixed built environment waste collected via skip bins is more difficult to recycle than pre-sorted waste, as waste materials that are mixed together require more advanced sorting, with product contamination an issue.

ORGANIC WASTE (PRIORITY WASTE)
Organic waste includes food, garden and agricultural waste. Organic waste from food is the largest type of waste by weight in MSW. Most food waste comes from households and the general community. Other generators of food waste include food manufacturers and hospitality and food service businesses.

Food and other organic waste can be used in the production of compost or as feedstock for technologies that create biofuels or bioenergy. The production of compost accounts for most of the organics currently recovered but is a challenging business in Queensland due to low-value or undeveloped markets, contamination concerns and basic processing technologies, although there’s scope for the development of new market opportunities.

For example, anaerobic digestion technologies, commonly used in the UK, Europe and other countries to produce biofuels and bioenergy from other organic waste, also present an opportunity for Queensland.

Greater recycling of organics presents an economic opportunity but will require a change in collection systems and the adoption of proven technological advancements in processing methods.
PLASTIC WASTE (PRIORITY WASTE)
Plastic can be recycled back to its previous form (bottles, containers) or used to produce other products such as furniture, building materials or as an element in road pavements, although only small volumes are recycled into new products in Queensland.

ELECTRONIC AND BATTERY WASTE (E-WASTE) (NATIONAL PRIORITY WASTE)
The quantity of used batteries is rapidly growing across Australia and the volumes of electrical equipment and battery waste going into Australian landfills are increasing. Around 70 per cent of the toxic chemicals found in landfill are a result of batteries and other e-waste; a major cause of environmental harm if not managed correctly.

Disposing of batteries and e-waste to landfill isn’t only harmful to the environment; it’s also a lost economic opportunity as the valuable but potentially hazardous materials they contain such as lead, nickel, cadmium or mercury, could potentially be recycled.

TYRE WASTE
Tyres are a regulated waste in Queensland.
Most tyre waste that’s recovered is shredded and exported overseas as fuel for cement kilns. Domestic recycling options are well established but constrained by market outlets for the products. Official data doesn’t capture all tyre waste, and better outcomes can be achieved with the development of appropriate end markets and innovative technologies.

TEXTILE WASTE
Discarded leather and textile products, if not donated for re-use, will mostly end up in landfill.

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2 The Australian Government, in its annual National Waste Report, identifies nine core waste categories and outlines the type of waste materials included in each. In Queensland, core waste categories align with the national categories, however, use slightly different terminology.
3 Economic opportunities for the Queensland waste industry: final report (figures are FY2017).
4 Built environment waste is commonly called construction and demolition waste (C&D)
5 Recycling and waste in Queensland 2018 (nearly 1 million tonnes of C&D waste came from interstate)
The circular economy

As nations around the globe work on ways to reduce, identify and develop alternatives to landfill disposal, the circular economy model provides an economically, socially and environmentally sustainable alternative to established norms.

Rather than following a linear ‘take-make-use-dispose’ model, circular economy principles consider opportunities across the entire supply chain to retain and circulate resources in the economy at their highest value for as long as possible. The waste management and resource recovery sector can play an important role in the transition to a more circular economy. Applying circular economy principles to the sector needs to reflect:

- avoiding waste generation (for example, banning single-use lightweight plastic shopping bags and better product design)
- designing products to last longer, be remanufactured, re-used, and recycled and that are created wholly or partly from recovered materials, and designing out unnecessary packaging
- an efficient and integrated recovery, reprocessing and market cycle for waste streams that can’t be avoided.

The circular economy model views materials as a valuable resource and encourages the circulation of these resources in the productive economy for as long as possible. It’s about retaining value in resources and adding value to waste materials, with a preference for local use, providing opportunities for new and innovative business ideas and new types of jobs. It has the potential to transform the way we design, teach and invest, and how we buy products, gradually moving towards an economy where there’s no waste and we use fewer virgin resources.

We've set a bold vision to become a zero-waste society. Adopting and implementing the circular economy model will be an important step towards achieving this vision.
OUTLINE OF A CIRCULAR ECONOMY

**PRINCIPLE 1**

Preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows. ReSOLVE levers: regenerate, virtualise, exchange.

**PRINCIPLE 2**

Optimise resource yields by circulating products, components and materials in use at the highest utility at all times in both technical and biological cycles. ReSOLVE levers: regenerate, share, optimise, loop.

**PRINCIPLE 3**

Foster system effectiveness by revealing and designing out negative externalities. All ReSOLVE levers.

Actions to date

We’ve already commenced setting a supportive policy environment for resource recovery industries and committed financial incentives to support the acceleration of successful projects to market. The Queensland Resource Recovery Industries Roadmap details how the Queensland Government will support the growth of new technologies and the expansion of established industries.

QUEENSLAND WASTE MANAGEMENT AND RESOURCE RECOVERY STRATEGY AND WASTE LEVY


The Waste Strategy's vision is for Queensland to become a zero-waste society, where waste is avoided, re-used and recycled to the greatest extent possible, and where strategic investment in diverse and innovative resource recovery technologies and markets will produce high-value products and generate economic benefits for the state.

The Waste Strategy has three strategic priorities, being to:

- reduce the impact of waste on the environment and communities
- transition Queensland towards a circular economy for waste
- build economic opportunity.

Commencing on 1 July 2019, the Queensland Government Waste Levy underpins the objectives of the Waste Strategy and will be initially set at $75 per tonne of general waste sent to landfill. Combined, the Waste Strategy and the Waste Levy will act to:

- facilitate and encourage waste and recycling infrastructure investment
- incentivise new industries that manufacture products for re-use, recycling and reprocessing.

Other Australian and international jurisdictions have achieved positive results by adopting a comprehensive waste management and resource recovery strategy accompanied by a waste levy. We’ve committed to ensuring the introduction of the levy will have no direct impact on households. Together, the Waste Strategy and Waste Levy will work to change waste management behaviour and,
along with funding and other incentives, will drive the growth of resource recycling industries in Queensland.

The Waste Strategy sets ambitious targets for the reduction of waste to landfill in Queensland. Along with targeted financial incentives, it will enable the step-change required to grow resource recovery industries in the state.

By providing industry with an incentive to recover and recycle material currently going to landfill, new economic opportunities can be created while providing long-term protection of our natural environment.
The RRIDP is funded from the Waste Levy and will be used to develop a high-value resource recovery industry. The focus of the RRIDP is to support the development of projects that divert waste from landfill, reduce stockpiling, and encourage activities that facilitate waste avoidance and increase recycling activities.

Financial assistance will be provided for the development of eligible projects that:

- facilitate recycling activities, waste avoidance and landfill diversion (including the diversion or reduction of waste material stockpiling)
- enhance economic development opportunities through the development of advanced processing and technology capacity
- facilitate and encourage waste infrastructure investment
- promote regional market and job development opportunities.

We’ve announced funding directed to projects of varying scales and areas of focus. Grants will be awarded through a competitive process under three streams.

**STREAM ONE:** Dollar-for-dollar capital grants of between $50,000 and $5 million to provide funding for infrastructure projects, to enhance or build new facilities, or capital investments in new processing and technological capabilities.

**STREAM TWO:** Offers broader incentives to attract or expand major resource recovery operations that will divert significant amounts of waste from landfill, reduce or prevent stockpiling, and recover substantial resources.

**STREAM THREE:** Assists with funding late-stage investigations which will lead to capital-intensive, long lifecycle projects.

Funds under the RRIDP could also be directed to other transformational projects as outlined under the Roadmap actions.

It’s expected that a broad mix of recipients from across Queensland representing business, industry and local government will respond to the program. Rigorous assessment and ongoing program evaluation will ensure that learnings from the RRIDP will provide a feedback loop to government on the factors that enable success and ‘what works’.
QUEENSLAND WASTE TO BIOFUTURES FUND (W2B FUND)

In 2018, we announced $5 million in funding to support the development of waste to bioproducts, biofuels and bioenergy projects in Queensland. The Queensland Waste to Biofutures Fund (W2B Fund) provides matching grants of up to $1 million for eligible projects under two funding pathways:

- **Pathway 1**: Grants for installation of new technology, plant and equipment.
- **Pathway 2**: Grants for research and collaboration projects that accelerate the commercial readiness of a Queensland biofutures facility.

The W2B Fund targets pilot, demonstration or commercially scalable projects that utilise waste to produce bioproducts, biofuels and bioenergy (including dispatchable renewable electricity). Funding is available for new greenfield facilities or for the expansion of existing facilities, and projects eligible for the W2B Fund do not need to demonstrate waste diversion from landfill. Feedstocks include carbon-rich waste from agriculture, food processing, construction and industrial processes.

Under Funding Pathway 1, the type of projects expected to seek funding include pilot, demonstration or commercial facilities capable of processing bioproducts; for example, biochemicals or bioplastics, or bioenergy such as liquid fuels or electricity.

Under Funding Pathway 2, applications from collaborative partners could include research projects such as feedstock trials or technical and engineering assessments associated with production activities. A collaborative partnership could be a joint venture between a university and biofuel producer.

Projects from the Queensland biomanufacturing and biorefining sectors can deliver transformative environmental, economic and social outcomes for Queensland. They also may contribute to the objectives of the Advancing Queensland Priorities and the Waste Strategy by:

- enhancing the commercial development of Queensland’s biofutures industry
- increasing Queensland’s capacity in resource recovery and the production of biofuels and bioenergy, particularly in regional areas of Queensland
- moving Queensland towards a circular economy by managing materials and resources to retain value and minimise residual waste, and developing local economies.
Queensland resource recovery industries: The opportunity

Economic value and jobs for Queensland can be created through the development of the resource recovery industries sector. Best practice examples from Queensland and other jurisdictions in Australia demonstrate the capacity for jobs to be created once waste is recovered. For every 10,000 tonnes of waste that goes to landfill, it’s estimated that fewer than three jobs are supported, but where that waste is recovered, it’s estimated there are more than nine jobs created.

SEQ has modern waste and recycling facilities and the private sector already plays a major role in the collection, transfer, disposal and processing of waste. Some regional areas of Queensland are home to leading best practice examples in organics processing, recovering a wide range of commercial, industrial and agricultural wastes. There’s potential for similar facilities to be developed in other regions and for these facilities to capture additional organic materials to support landfill diversion targets. Opportunities for more advanced resource recovery facilities in regional areas in Queensland could be supported by regional ‘hubs’ or precincts where economies of scale are realised.

Moving towards a zero-waste society, supported by transitioning to a more circular economy, will drive new economic activity and employment as resource use is optimised and new markets and technologies are developed.

Matching available skills to emerging jobs is key to accelerated industry development. New technologies and processes will provide challenges to existing operations but also opportunities to create a high-value, skilled workforce. Following principles developed in other industries (manufacturing, for example), existing skills can shift to the required skills without disruption. Embracing Industry 4.0 (the next industrial revolution) and working with other industries to transition to new technologies will provide economic benefits across Queensland.

Significant ongoing commitment from all stakeholders is required to shift the resource recovery industry towards the goal of a more circular economy. Such a transition could deliver a radical and enduring transformation of Queensland’s economy, with opportunities to increase economic output and jobs across the state.

Our ambition of a zero-waste society has strong community and industry support and momentum continues to grow.

By identifying priority waste types, we’ve set an agenda to accelerate change. This includes the introduction of new initiatives and incentives to separate waste and enhance the recoverability of waste streams. We’ll also work with industry to develop pilot programs and demonstration projects focused on priority waste types. We’ll continue to roll out the RRIDP, which acts to incentivise industry and accelerate investment into the sector.

The Waste Levy will propel positive change in Queensland by putting a price on waste and acting as a deterrent to disposing of waste to landfill. Revenue from the levy will be used to facilitate industry development, to expand and advance the resource recovery industry through direct grant funding (RRIDP), and to support other initiatives, for example, the development of resource recovery precincts in the Queensland context.

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6 Economic opportunities for the Queensland waste industry: final report (QTC)
7 Queensland Draft Waste Management and Resource Recovery Strategy
CASE STUDY
TOWNVILLE RED (TBC)
CONTENT TO COME
Queensland resource recovery industries: The challenges

In FY2018, Queensland households, businesses and industry generated 10.9 million tonnes of waste, an 11 per cent increase from the previous year and representing a greater rate of increase than population growth.8

As Queensland’s population continues to grow and consumption increases, effective, fit-for-purpose waste avoidance and resource recovery pathways and solutions need to be continually developed. Managing waste and waste material supply chains in Queensland is more difficult compared to other mainland states such as New South Wales and Victoria due to the state’s large land area and its dispersed population.

Around 72 per cent of Queensland’s total population reside in the south-east of the state (SEQ), although this region represents only around 1.5 per cent of the total land area. In contrast, regional communities represent around 28 per cent of the total population. However, these regions cover the remainder of the state and are spread across vast distances9.

Source: QGSO Population Growth Highlights and Trends, Queensland regions 2018* Population figures are rounded to nearest 1000.
Added to this are regional economic and climatic characteristics that create significant variation in the types of waste management and resource recovery facilities required. Solutions for resource recovery will need to respond to the specific issues faced by regional communities and local governments, including the very different market dynamics to those of the heavily populated SEQ region.

Although the concentration of Queensland’s population in SEQ creates a challenge, it also presents an opportunity. Waste is usually disposed close to the source of generation. With such a dense population, feedstock for resource recovery industries is assured and economic efficiencies can be attained.

Industry has identified nationwide challenges including a lack of source-separation collection systems, limited facilities for the recovery of mixed wastes, and limited activity to recover putrescible waste from households and small to medium enterprises (SMEs).

Current collection systems are also inadequate to deliver significant further benefits. Better segregation of waste materials at the source will have additional positive implications for MRFs due to the reduction in contamination and will create greater economic flow-on effects.

Other industry-identified challenges include:

- environmental policy and regulatory consistency
- land-use planning consistency and certainty
- data limitations
- under-developed end markets
- social licence to operate
- dynamic feedstock supplies.

Several actions are underway to ensure consistency across environmental policy and regulations for the resource recovery industry, as is work to identity appropriate land-use planning frameworks, dependent upon project scale and location. Work is also being undertaken to develop robust data collection methodologies and reporting processes.

Due to limited markets for some recycled products or waste suitable for recovery, investment in the resource recovery industry has been constrained. Working across government to develop procurement policies that utilise recycled or remanufactured waste products has been identified as a first step towards developing sustainable markets for the resource recovery industries. Such an action will take a combined effort by all stakeholders.

By promoting positive outcomes, government and industry can work together to overcome challenges associated with social licence and community perceptions of the industry through the promotion of positive outcomes. Challenges related to the dynamic industry environment, e.g. where waste feedstock demand may change over time, will need to be managed by industry through appropriate risk mitigation strategies.
Queensland resource recovery industries
Roadmap actions

Our goal is to position Queensland as a leader in resource recovery, reprocessing and manufacturing over the long-term. We'll work with key stakeholders to expand capabilities in the resource recovery industries so that Queensland becomes a highly competitive centre for the remanufacture of waste materials into new products.

We'll offer industry development support to resource recovery industries looking to employ innovative technologies along the entire supply chain, from collection and transfer to sorting, re-manufacturing and re-use of waste materials.

The Resource Recovery Industries 10-Year Roadmap and Action Plan establishes an agenda for industry development and incentivisation. This will be developed through consultation with local government, industry and specialist business units within government. Actions in the Roadmap will drive the implementation of economic opportunities in the Waste Strategy.

Four strategies have been identified that will enable our vision for resource recovery industries to contribute measurable economic and environmental benefits to the Queensland economy. These strategies will:

- accelerate the project pipeline
- drive the development of markets and supply chains across Queensland
- review policy and legislative frameworks to enable industry growth
- encourage the advancement of new technologies.

Strategy actions will help industry to accelerate investment decisions, modernise and enlarge current operations, enable the development and growth of new resource recovery businesses and supply chains.

The Roadmap is an action under the Waste Strategy and is focused on the implementation and delivery of projects and enabling actions. The Roadmap will identify opportunities to attract investment and create jobs to promote the growth and sustainability of resource recovery industries.

The $100 million RRIDP complements the Roadmap. This three-year program will provide grant funding through a competitive process to support the acceleration of successful projects. The RRIDP will target investment incentives where gaps and opportunities exist for the private sector and local governments.

The Roadmap will be established, administered and delivered by a dedicated unit within the DSDMIP. This team will work collaboratively across government, industry and research institutions to drive development and investment into the resource recovery sector.

By adopting a partnership approach to the implementation of these actions and supporting initiatives, programs, workshops and services, we can guide sustainable growth in resource recovery industries and work to resolve market inefficiencies.
ACTIONS SUPPORTING STRATEGY 1:
Accelerating the project pipeline

RESOURCE RECOVERY INDUSTRY DEVELOPMENT PROGRAM

Direct support for waste and resource industry development initiatives will be provided through the $100 million RRIDP. The RRIDP provides grant funding to support the acceleration of eligible projects and will kick-start the growth of the resource recovery industries in Queensland. It provides a clear sign to industries that we’re committed to co-investment in waste management and resource recovery technologies.

- Deliver the $100 million RRIDP over three years.

INDUSTRY DEVELOPMENT

By working with proponents, we can accelerate the establishment of new resource recovery facilities and the improvement of existing facilities.

Proponents suitable for positive intervention to fast-track their investment decisions and accelerate project delivery timeframes are those that are likely to establish in Queensland in the future, and who can demonstrate proven technologies, economic benefits to Queensland and the creation of new jobs (and/or upskilling of the workforce).

Positive intervention could include business case development and market sounding, planning and locational advice, or project facilitation across government. We can further enhance the economic benefits of suitable investments by assisting proponents to establish in locations that optimise market and supply chain development.

- Provide project facilitation services to industry.
- Develop a baseline for resource recovery industries employment growth and economic impact analysis.

PRECINCT DEVELOPMENT AND GUIDELINES

The co-location of complementary industry activities in a precinct has proven successful in other jurisdictions globally. Circular economy precincts elsewhere co-locate industry with technologies that convert waste to bioenergy, which is then delivered back into the precinct (rather than the grid), enabling a flow-through of economic benefits.

Valuable lessons can be gained from these other jurisdictions to inform precinct development guidelines, as can the learnings gained from the facilitation of large resource recovery projects wishing to locate in Queensland. This evidence base will enable us to develop guidelines for precincts at different scales.

Several complementary actions need to occur to drive successful precinct developments and will require considerable input from across government, industry and key stakeholders. The identification of planning pathways to facilitate the development of precincts will need to be determined on a case-by-case basis and will need to consider timeframes required.

- Identify pathways to facilitate precinct development where serviced, connected and available industrial land is in place across Queensland.
- Investigate potential locations for regional resource recovery precincts and identify the appropriate scale and support required to ensure their viability.
- Develop location strategies to ensure critical mass for precincts.
- Investigate and identify suitable industrial lands for precincts, including in regional areas, that will support technologies such as EFW production, and where these facilities are best placed to support future secondary markets.
- Building on completed research, investigate the application of global examples of circular economy precincts to the Queensland context and apply these findings to precinct development guidelines.
- Incentivise projects that align with state priorities for the sector to establish in preferred locations/precincts or to co-locate with complementary facilities.
- Promote the benefits of clustering complementary industries together. Clustering may include industries other than resource recovery industries.
- Identify policy and project facilitation gaps and work across government to ensure alignment for the achievement of key objectives.
RECYCLING
PLASTIC, METAL, GLASS, NEWSPAPER & CARDBOARD
NO PLASTIC BAGS
3463 8938
ACTIONS SUPPORTING STRATEGY 2: Market and supply chain development

Roadmap actions are focused on providing direct support to industry through industry development initiatives. These actions respond to feedback from industry and other stakeholders and are further supported by the Waste Strategy.

MARKET DEVELOPMENT AND INDUSTRY ATTRACTION

- Deliver a comprehensive analysis of the resource recovery market sector, including the identification of supply chain efficiencies and the promotion of new market opportunities.
- Develop industry attraction programs focused on technologies and industries that will utilise recycled output to develop secondary markets for waste that are valuable and useful.
- Investigate and report on export opportunities for value-added recycled products for the development of secondary markets and to minimise stockpiling of recycled material.
- Coordinate supply chain development services and activities across the state, including customised activities to meet local regional needs, where appropriate.
- Consult with regional teams to understand issues that relate to waste management and resource recovery in their region and work to develop a model for regional hubs or precincts. This may include analysis of economic cost/benefits to locate certain facilities in regional areas.
- Deliver business development and capability programs to enable small to medium enterprises (SMEs) and small regional councils to participate fully in market opportunities, such as workshops led by the department.

Aggregated findings arising from the RRIDP will provide government with an evidence base to support the ongoing development of successful incentives and/or initiatives. This data will also help identify gaps in the market and future opportunities as the market matures.

- Analyse aggregated data from the RRIDP to provide insights into opportunities and challenges faced by proponents to inform ongoing market development initiatives.

PROMOTION AND PROCUREMENT INITIATIVES

Government can act as a leader to other organisations through demonstration or promotion of resource recovery projects or processes. Government also has the potential to be a major consumer of recycled products or products with a recycled component.

- Promote exemplar resource recovery precincts in Queensland to demonstrate investment readiness.
- Review resource recovery initiatives on large government-led projects to develop best practice guidelines.
- Investigate opportunities for recycled products or materials to be included in government procurement policies.
The QWRRIP contributes to the Department of Environment and Science’s objective to improve waste and resource recovery for Queensland through identifying the waste infrastructure needs for the state as they align with the Waste Strategy.

The QWRRIP will be a forward-looking document that identifies how Queensland can achieve an integrated waste and resource recovery infrastructure system that effectively manages the expected mix and volumes of waste, minimises the impacts on the environment and public health, supports a viable waste industry, and ensures valuable materials are diverted to their highest use, while providing that material value is maintained for as long as possible, and delivers on the objectives of the Waste Strategy.

The key goals of the QWRRIP will include:

- identifying the anticipated service needs and infrastructure investment opportunities to meet the draft Waste Strategy targets
- ensuring, where possible, only residual waste goes to landfill, consistent with the draft Waste Strategy
- setting the strategic direction and fostering innovation in delivering waste and resource recovery outcomes through an improved network of waste and resource recovery infrastructure
- identifying opportunities to build regional capacity and improve the efficient management of waste and resource recovery across Queensland
- identifying actions and data collection processes that are focused on obtaining the data required to make informed investment decisions and inform departmental policy decisions, and providing a foundation for the development of regional waste infrastructure plans
- supporting industry development and economic growth
- supporting significant investment programs into waste and resource recovery infrastructure.
ACTIONS SUPPORTING STRATEGY 3:
Responsive policy and legislative framework

We'll review opportunities where the statutory planning framework can be used to enable growth of the resource recovery industries, particularly through the utilisation of suitably located industrial land for new facilities, including for hubs or precincts.

- Ensure planning policy documents adequately provide for the consideration of resource recovery industries needs and are supported by guidance to further assist the facilitation of resource recovery industries.
- Ensure the availability of adequate and suitable industrial land throughout Queensland is identified.
- Identify pathways to facilitate resource recovery industries that align with state priorities for the sector.

ACTIONS SUPPORTING STRATEGY 4:
Advancing new technologies

New technologies will need funding and other support to work towards commercialisation and to establish a market for products or recycled materials.

The Roadmap will advance innovative new technologies by providing links to investment funding partnerships and other programs, relationship building activities and the promotion of key achievements.

- Promote advancements in technological processes that work to drive the achievement of a zero-waste society.
- Promote the adoption of internationally best practice technologies and processes that meet environmental and community standards.
- Co-invest in pilot or demonstration projects or commercially scalable projects in Queensland that recycle, re-use or remanufacture waste into new products and that demonstrate a viable market.
# Resource Recovery

## 10-Year Roadmap and Action Plan

### VISION

A sustainable resource recovery industry sector that provides measurable economic and environmental benefits to the Queensland economy, creates new jobs, provides upskilling opportunities for the workforce, and builds capacity and new markets in regional areas.

### STRENGTHS AND OPPORTUNITIES

- Existing investment in collection and transfer infrastructure
- Potential to create new economic activity and employment
- Waste levy provides an incentive for change
- Coordinated policy response across Queensland
- Committed investment and incentives
- Community support to move to a zero-waste society

### PRIMARY CHALLENGE

Supporting current industries to modernise and grow while advancing new technologies and product development in under-developed end markets.

### SPECIFIC CHALLENGES

- **DATA**
  - Community support to move to a zero-waste society
  - Committed investment and incentives
  - Coordinated policy response across Queensland
  - Waste levy provides an incentive for change

- **ENVIRONMENT**
  - Waste levy provides an incentive for change

- **PLANNING CERTAINTY**
  - Waste levy provides an incentive for change

- **SYSTEMS**
  - Waste levy provides an incentive for change

- **SOCIAL LICENCE**
  - Waste levy provides an incentive for change

### UNDER-DEVELOPED END MARKETS

Amplify the project pipeline and accelerate the project delivery and scale up the project pipeline.

### STRATEGY 1: Accelerating the project pipeline

**ACTIONS**

- Deliver the $160 million RRIDP over three years.
- Provide project facilitation services to industry.
- Develop a baseline for resource recovery industries employment growth and economic impact analysis.
- Identify pathways to facilitate precinct development where serviced, connected, and available industrial land is in place across Queensland.
- Investigate potential locations for regional resource recovery precincts and identify the appropriate scale and support required to ensure their viability.
- Develop location strategies to ensure critical mass for precincts.
- Investigate and identify suitable industrial lands for precincts, including in regional areas, that will support technologies such as EWF production, and where these facilities are best placed to support future secondary markets.
- Building on completed research, investigate the application of global examples of circular economy precincts to the Queensland context and apply these findings to precinct development guidelines.
- Incentivise projects that align with state priorities for the sector to establish in preferred locations/precincts or to co-locate with complementary facilities.
- Promote the benefits of clustering complementary industries together. Clustering may include industries other than resource recovery industries.
- Identify policy and project facilitation gaps and work across government to ensure alignment for the achievement of key objectives.

### STRATEGY 2: Market and supply chain development

**ACTIONS**

- Deliver a comprehensive analysis of the resource recovery market sector.
- Develop industry attraction programs focused on technologies and industries that will utilise recycled output to develop secondary markets.
- Investigate and report on export opportunities for value-added recycled products for the development of secondary markets.
- Coordinate supply chain development services and activities across the state, including customised activities to meet local regional needs, where appropriate.
- Consult with regional teams to understand issues that relate to waste management and resource recovery specific to their region.
- Deliver business development and capability programs to enable SMEs and small regional councils to participate fully in market development initiatives.
- Analyse aggregated data from the RRIDP to inform ongoing market development initiatives.
- Promote exemplary resource recovery precincts in Queensland to demonstrate investment readiness.
- Review resource recovery initiatives on large government-led projects to develop best practice guidelines.
- Investigate opportunities for recycled products or materials to be included in government procurement policies.

### STRATEGY 3: Responsive policy and legislative framework

**ACTIONS**

- Ensure planning policy documents adequately provide for the consideration of resource recovery industries’ needs and are supported by guidance to further assist the facilitation of resource recovery industries.
- Ensure the availability of adequate and suitable industrial land throughout Queensland is identified.
- Identify pathways to facilitate resource recovery industries that align with state priorities for the sector.

### STRATEGY 4: Advancing new technologies

**ACTIONS**

- Promote advancements in technological processes that work to drive the achievement of a zero-waste society.
- Promote the adoption of internationally best practice technologies and processes that meet environmental and community standards.
- Co-invest in pilot or demonstration projects or commercially scalable projects in Queensland that recycle, re-use or remanufacture waste into new products and that demonstrate a viable market.
Definitions

**Anaerobic digestion:** putrescible waste is decomposed under anaerobic conditions in a controlled vessel and the resulting methane (or biogas) is captured and used as an energy source.

**Alternate waste treatment:** advanced waste processing and recovery technologies that provide an alternate management option to landfill disposal.

**Bagasse:** dry pulpy fibrous residue that remains after sugarcane or sorghum stalks are crushed to extract their juice. Used as a biofuel for the production of heat, energy, and electricity, and in the manufacture of pulp and building materials.

**Biosolids:** a by-product of sewage treatment processes.

**C&D:** construction and demolition waste, generated by demolition and building activities, including road and rail construction and excavations.

**C&I:** commercial and industrial waste, generated by institutions and businesses, including industries, restaurants and offices.

**Diversion:** waste that would usually be disposed to landfill is diverted to another more productive purpose such as reuse, recycling or energy recovery.

**Dry recyclables:** material such as paper/cardboard, glass, plastics and metals. Co-mingled recyclables refer to these materials combined in a single collection bin.

**EFW:** energy-from-waste facility, converts waste (including refuse-derived fuel) into energy (including heat, electricity, gas or liquid fuels) for which there’s an economically viable end use. Technologies can include, but aren’t limited to: anaerobic digestion, combustion, pyrolysis, gasification and plasma gasification.

**Ethanol:** produced from biomass mostly via a fermentation process using glucose derived from sugars (sugar cane, sugar beet and molasses), starch (corn, wheat, grains) or cellulose (forest products) as raw materials. In this form, it’s renewable. Synthetic ethanol can also be produced from non-renewable sources like coal and gas.

**Feedstock:** raw materials sourced as inputs for the process.

**Inert waste:** non-putrescible and generally inorganic waste (mostly from construction and demolition activities including soils, concrete, bricks, tiles, plastic and glass).

**In-vessel composting:** enclosed composting technologies where putrescible waste is composted under controlled conditions in a sealed vessel, usually used to process more odorous and difficult organic wastes such as food organics and industrial/commercial/agricultural organics.

**MBT:** mechanical-biological treatment plant, a facility that processes mixed putrescible waste to separate recyclables and an organic fraction from the residual waste.

**MRF:** materials recovery facility, receives and sorts either source-separated commingled recyclables (clean MRF) or mixed waste (dirty MRF). Materials are sorted through mechanical and manual processes, then consolidated (compacted and baled) and sent to reprocessing facilities.

**MSW:** municipal solid waste, primarily household waste collected by, or on behalf of, councils. Also includes other waste collected by councils such as from public-place bins and council operations.

**Offtake market:** the market in which producers of a resource sell.

**Open windrow:** the production of compost by piling organic matter or biodegradable waste in long rows.

**Putrescible waste:** organic material, including food and garden waste that will decompose as a result of the actions of microbial organisms.

**Refuse-derived fuel:** fuel manufactured from waste materials by processing mixed waste to take out recyclables, low calorific/wet components and hazardous materials and produce a homogenised fuel material.

**Residual waste:** waste that’s collected separately from households in the residual (or general) waste bin for disposal to landfill.

**Resource recovery centre:** facility that receives reusable and recyclable materials from households and businesses that would otherwise be destined for disposal. Often combined with a transfer station for residual wastes. May include a resale centre and/or basic reprocessing activities on the same site such as mulching of green waste or crushing of concrete.

**Sugarcane ethanol:** an alcohol-based fuel produced by the fermentation of sugarcane juice and molasses. A leading renewable fuel for the transportation sector.

**Transfer station:** facility allowing the drop-off and consolidation of waste and a wide range of recyclable materials. Can be combined with a resource recovery centre and other facilities and may include a resale centre ("tip shop").

Source: adapted from Queensland waste and resource recovery infrastructure report (Arcadis) and Resource Recovery Industry Development Program Guidelines (Queensland Government).

Glossary

AD: Anaerobic Digestion
C&D: Construction and demolition
C&I: Commercial and industrial
EFW: Energy-from-waste
FY: Financial year
MBT: Mechanical biological treatment
MRF: Material recycling facilities
MSW: Municipal solid waste
PAC: Paper and cardboard
SEQ: South East Queensland
SME: Small to medium enterprises
recycle here!

glass bottles, cardboard, cans, paper and plastic containers

no food scraps
no plastic bags

do the right thing
use the RIGHT BIN
Resource recovery actions can extend the life of existing landfills and reduce the need for new landfill space to be developed, while also helping to maximise the value from waste materials.