

Australia's Bioenergy Roadmap

Appendix – Community Support and Benefits

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1. Key findings

Communities typically associate two main economic benefits with bioenergy projects.

- Bioenergy offers income diversification for local businesses and creates new local employment opportunities.
- Bioenergy can replace costly energy sources such as natural gas, alleviating costs for local businesses. Many examples of businesses that have successfully established bioenergy plants from their own industrial waste streams were highlighted throughout the consultations.
- **Community concerns typically focus on bioenergy resources, products and projects.** Experience from overseas, from past projects in Australia and the development of new industries more generally, has shown that addressing these concerns is a critical step for developers of bioenergy projects. In particular:
 - ◊ **On resources, concerns revolve around sustainability considerations related to forestry and agricultural resources.** These include concerns around the productive use of Australia's native forests, the removal of agricultural residues essential for soil fertility and carbon sequestration, and the food-versus-fuel debate.
 - ◊ **On products, concerns revolve more specifically around road transport biofuels and their impact on vehicle operability.** In that regard, bioethanol fuel mandates in New South Wales and Queensland have shown the importance of consumer education campaigns.
 - ◊ **On projects, concerns revolve around local pollution (odours and pollutants) arising from bioenergy projects in or near residential areas.** Industry stakeholders also raised the risk to future projects of unviable technologies significantly damaging long-term perceptions of the bioenergy industry, suggesting that tried-and-tested technologies have attracted wider support and resulted in better performance outcomes.
- **To ensure community support for bioenergy products and projects, stakeholders called for increased levels of community engagement and consultation.** The diversity of feedstocks and end-use markets in the industry add complexity to gaining social acceptance.
- Three guiding principles for project proponents, industry associations and governments could help maximise community support and positive outcomes:
 1. consistent best practice guidelines for consultation and engagement
 2. broad community advocacy
 3. project-specific community consultations

2. Appendix overview

This appendix explores the key community concerns and social benefits of various bioenergy markets and projects. Building on this, it finally proposes actions to improve community engagement.

Guidance on actions to obtain community support are based on relevant stakeholder consultation, a review of industry best practice and international research on countries with more developed bioenergy industries. These actions are presented as being agnostic across the various bioenergy pathways of Australia's Bioenergy Roadmap, and impact both potential bioenergy end-use markets and projects. However, they should be applied on a case-by-case basis to ensure effective adaptation to the circumstances of individual communities.

3. Community concerns

Stakeholder consultations and public submissions have highlighted a range of community concerns surrounding the bioenergy industry. They can be summarised into the three following common themes: bioenergy projects, resource sustainability and bioenergy products.

It is noted that communities often also recognise the many benefits, including jobs and local industry development. The focus of this section on concerns is so that barriers to future growth are fully understood and can be addressed.

Concerns relating to bioenergy projects

Local opposition to bioenergy projects in the direct vicinity of communities was a common theme from stakeholder engagement and research [2].

For example, community concerns could relate to the potential generation of unpleasant odours and hazardous contaminants from bioenergy projects.

Consideration should be given to these issues during early community consultation processes (see case study below).

Scania's poop-powered Bus, United Kingdom

Global vehicle manufacturer Scania first introduced a biogas-fuelled bus into the United Kingdom transport market in 2013, also originally known as the 'poop-powered bus'. These bio-buses are commonly thought to produce an unpleasant smell as they rely on food and sewage waste as feedstock. However, the biogas fuel does not emit any unpleasant odour from bus exhaust systems despite being made from sewage waste.

The waste is first processed through anaerobic digestion and then further processed to achieve the composition of natural gas [3]. The biogas fuel produces up to 90 per cent less greenhouse gas emissions than regular diesel. Social license issues must be carefully addressed to discern between any perceived or actual risk of residential pollution, which could prevent the uptake of renewable bioenergy projects.

The viability of bioenergy technologies has also been highlighted as a concern throughout the stakeholder engagement process.

Introducing immature bioenergy technologies into the market can lead to suboptimal outcomes and project failures, which can have a lasting impact on community perceptions of bioenergy.

As most bioenergy markets can benefit from mature and commercial technologies, stakeholders suggested leveraging these technologies first to secure community support.

Solid WtE Recycling Facility, Wollongong (New South Wales)

The Solid WtE Recycling Facility (SWERF) project in Wollongong started in 2001, but ultimately failed two years later, reportedly due to the uncommercial nature of the technology at the time. The SWERF project proposed a world first technology processing MSW into biogas. However, the project was responsible for major breaches of environmental licences and emissions of toxic chemicals. Its failure resulted in a more than \$160 million loss for Energy Developments, including \$1.5 million spent by Wollongong City Council. This project failure had a negative impact on industry, government and public attitudes toward bioenergy in New South Wales for many years after the collapse. [4]

Concerns surrounding resource sustainability

Common sustainability themes include the use of forestry-derived feedstock, agricultural crop residues and the food-versus-fuel debate.

Community concern surrounding the sustainability of forestry-derived feedstock

The largest volume of concerns centred on the use of forest-derived feedstock, particularly the potential impacts that forest harvesting have on total greenhouse gas emissions.

There is concern that this results in a decline in the average carbon content of forests over time, which leads to increased carbon dioxide in the atmosphere. This concern also arises from the perception that carbon from harvested trees is not recaptured within critical timeframes.

Industry stakeholders presented an alternative view

Agricultural stakeholders identified confusion in the public use of the terms 'land clearing' and 'harvesting', which are often used interchangeably. However, land clearing involves the removal of vegetation cover from forested areas, whereas harvesting involves the removal and replacement of trees for further harvesting.

Forestry stakeholders identified that the area certified under the Responsible Wood Certification Scheme has more than doubled since 2011 and 1.2 million hectares are certified under the Forest Stewardship Council (FSC). Wood and wood-based products can be traced using the chain of custody certification provided by these schemes [6].

Concern around removal of agricultural crop residues

Crop residues preserve soil moisture and soil productivity, reduce soil erosion and replenish soil organic carbon stocks and nitrogen pools [8]. Given that agricultural residues are an important bioenergy feedstock, it is important that this is taken into account. As of 2018, between 10 and 27 per cent of feedstocks used for operating bioenergy projects came from agricultural residues across Australia [9].

This concern could be addressed by ensuring that the greenhouse gas emissions resulting from the change in soil organic carbon stocks are included in the carbon accounting of bioenergy projects [8].

Concern that biofuel crops increase food prices

Consulted industry stakeholders were of the view that the perception 'biofuel crops increase food prices' is misguided.

It has now been demonstrated that corn used for ethanol production did not significantly increase food prices in the 2000s. The World Bank changed its stance on this issue in 2010 through attributing increased food prices to higher oil prices and refuting the claim that ethanol production was the cause [10].

Furthermore, one industry-led report prepared for Meat & Livestock Australia in 2017 found that there was limited evidence that the introduction of biofuel mandates in New South Wales and Queensland would have 'any significant impact on the price of domestic feed grains' [11]. Ultimately, it was found that sorghum use for biofuels would not represent a high proportion of sorghum production, and is unlikely to have an impact on broader food prices [11]. This needs to be considered in view of the low mandates currently in place in New South Wales and Queensland.

Food and fuel

The use of non-edible cellulosic plant material for second-generation ethanol fuel has reframed the discourse from food-versus-fuel to 'food and fuel'.

This signals a transition away from the common assumption of a zero-sum game between food and fuel. The US advanced biofuels company Gevo Inc., which supplied Brisbane Airport with sustainable aviation fuels (SAF) for Virgin Australia's trial, produces animal feed as a co-product with the unused protein from its non-edible field corn feedstocks [12].

Concerns relating to bioenergy products

The perception that biofuels have a detrimental impact on vehicle operability.

This issue has been widely blamed for the low uptake of biofuels and has been the result of low levels of community education and awareness of the actual potential impacts. However, this issue is certainly not the only reason for the low levels of community uptake. In addition, the actual availability of biofuels for purchase remains relatively limited so even those who may want to use biofuels may find limited options for refuelling. These issues continue to be harmful to Australia's biofuels market, which remains dominated by 1G biofuels used in light passenger vehicles (see case study below).

Ethanol fuel mandates in New South Wales and Queensland

New South Wales introduced an ethanol fuel mandate in 2007 and Queensland introduced a biofuel mandate in 2017. However, these mandates alone have not significantly increased ethanol blended fuel sales. Biofuels contributed 1.3 per cent of Australia's total liquid fuel supply in 2014–15 and dropped to 0.4 per cent in 2017–18 [13]. The volume of ethanol sold in New South Wales in 2018–19 made up 2.5 per cent of total fuel sales, which is well below the mandated 6 per cent [13].

Although this is partly due to the fuel distribution waiver system, stakeholders emphasised that negative community perceptions play a significant role. Despite the availability of feedstock and technology, the biofuels industry will be unable to achieve widespread commercialisation and demand if perceived negative impacts are not addressed. Education campaigns are an important part of building the consumer demand needed to support industry and policy initiatives such as biofuel mandates.

4. Social benefits

The bioenergy industry offers a range of positive social benefits, including increased regional economic activity and lower local energy costs, particularly in the heat market.

Increased regional economic activity

Depending on proponent and project-specific circumstances, the bioenergy industry can provide regional ongoing employment and economic development opportunities.

Employment opportunities exist in both the construction and operational phases of projects across the entire supply chain. Local resources and industrial waste streams can be utilised as feedstock to generate energy for both local and wider use.

Biohubs

The concept of 'biohubs' has recently gained traction amongst industry and government stakeholders as a model that would ensure bioenergy projects are established in strategic locations that take advantage of available resources. They could also substantially increase employment, industry collaboration, positive competition, and research and development.

The bioenergy hub model consists of connecting local businesses through their value chains, workforces, technologies, products and resources [14].

Australian case studies describing the G21 Geelong Regional Alliance biohub and Daintree Bio Precinct are outlined below.

Barwon Water and the G21 Geelong Region Alliance, Geelong (Victoria)

A prominent bioenergy hub led by Barwon Water is currently in development in partnership with the G21 Geelong Region Alliance. The Alliance consists of government, business and community organisations representing five municipalities across the Geelong region. The hub will consist of two Renewable Organic Networks that utilise industrial and municipal solid waste (MSW) streams to generate local renewable energy and agricultural soil enhancers [15]. It is projected to create 80 new jobs during the initial facility construction and ongoing operational stages.

The first network utilises local council collected MSW as a feedstock for local grid electricity generation. It will create over 20 jobs while diverting 20,000 tonnes of organic waste annually that is otherwise sent to landfill [16]. The second network utilises organic waste from the Australian Lamb Company and Bulla Dairy Foods as feedstock to generate electricity and hot water. It is projected to provide 17 local construction jobs and 45 local ongoing jobs [16].

This bioenergy hub model boosts regional economic activity through inter-industry and government collaboration and contributes to regional circular economy material flows. Similar hubs created around Australia where commercially viable (e.g. close to feedstock and end-use market demand) will create further value-added employment in regional areas.

Daintree Bio Precinct (Queensland)

Daintree Bio Precinct Ltd has recently announced the call for a partnership to co-locate business activities focused on the production of bio-based products next to its Mosman Sugar Mill, which is central to the economic growth of the Douglas Shire Council region [17]. Daintree Bio Precinct is owned by Queensland cane growers and has ten-year cane supply arrangements.

The selected partner will produce commercial bio-products using raw materials from the Mosman Sugar Mill. Daintree Bio Precinct owns 20 hectares of land adjacent to the mill, which allows for the co-location of a processing or production facility [17].

Studies have commenced into on-site energy production from anaerobic digestion and biogas processes [17]. Proximity to the sugar mill will enable easy access and transportation of the mill feedstock, such as sugarcane, bagasse, sugar and molasses for an effective bioenergy hub.

Lower energy costs in the heat market and for fringe-of-grid customers

Bioenergy projects, particularly in the heat market, can offer cost saving advantages in their ability to service businesses near generator plant sites (see case study below).

Some regional businesses that have implemented bioenergy projects have also benefited from the additional revenues associated with revenue diversification. This has been most notable in the case of heat projects and is dependent on proponent and project-specific circumstances.

The costs regional and fringe-of-grid businesses face for transmission infrastructure to connect to the centralised electricity grid can be prohibitive. Smaller-scale local bioenergy plants offer an affordable alternative. Through adapting business models to source some or all energy needs from behind-the-meter bioenergy projects, it has been shown that a substantial portion of capital can be freed up to expand operations and employment (see below).

Dongwha Australia, Bombala (New South Wales)

Lower heat costs have been demonstrated by Dongwha Australia's softwood timber mill in Bombala, south-east New South Wales. The timber mill previously faced a substantial cost burden by relying on natural gas to heat its timber kilns. Its \$10 million biomass boiler now acts as a gas substitute, using feedstock generated locally on-site. It has a capacity of 15 MW fuelled solely by the 200 tonnes of sawdust waste produced each day as part of the milling process [18].

Currently, commercial and industrial (C&I) customers on Australia's East Coast are experiencing high gas prices, with wholesale prices increasing threefold in nine years from approximately \$3/GJ in 2011 to \$9–\$12/GJ in 2020 [19]. High energy prices have been cited as the reason a number of businesses (e.g. Remapak in Western Sydney and Claypave in Queensland [20] [21]) have become unviable or entered voluntary administration. This has come with associated employment losses.

By comparison, Dongwha has indicated that its shift to a biomass boiler has reduced costs substantially, replacing the need for gas by utilising its on-site generated sawdust, which is otherwise classified as a waste product. Sawdust is an inevitable by-product of the milling process and therefore provides a huge cost-saving opportunity for the timber industry when utilised as a feedstock for bioenergy. Although this is a specific opportunity for Bombala, similar companies around Australia may be able to take advantage of these circumstances to leverage bioenergy feedstocks to reduce their costs.

5. Actions to improve community engagement

Improving community engagement and support are key enablers to expanding Australia's bioenergy industry.

It is commonly recognised across a range of industries that effective community engagement can significantly contribute to greater project, industry and community outcomes.

Industry and governments are increasingly incorporating community engagement into standard project planning, development and implementation processes. There has been a shift in approach to project decision-making from 'announce and defend' to 'debate and decide' [22].

The growing importance of improving community engagement and support is increasingly relevant as greater scrutiny is being placed on the behaviour of institutions [23]. This is particularly relevant to industries directly involved in the energy transition as the advocacy and urgency around climate change and environmental challenges continues to grow [23].

Some key benefits of effective community engagement are summarised in the table below [1] [22] [23].

Table 1 – Key benefits of effective community engagement

Benefit	Description
Increased transparency	Early and ongoing community engagement leads to increased transparency around decision-making as project proponents offer easy access to information and updates.
Greater monitoring and evaluation frameworks	Early stage and ongoing community engagement require well-established monitoring and evaluation frameworks to consistently and transparently measure whether promised benefits are being realised.
Increased push for value for money	Community engagement and relationship building place additional accountability on project proponents to ensure that local communities are not being economically disadvantaged by project developments.
Early identification of risks	Enabling local communities to raise any potential economic, social or environmental risks before decisions are finalised allows project proponents to proactively address concerns as they arise.
Shared problem-solving	Community engagement leads to a sense of shared project ownership, which in turn encourages shared problem-solving as multiple perspectives are taken into account to ensure effective and holistically considered outcomes.
Utilisation of local knowledge	Local knowledge often adds insights to decision-making that are otherwise not considered. This includes ensuring community engagement with Traditional Owners of the Land.
Local employment opportunities	A sense of shared ownership and the utilisation of local knowledge enhance community support and the leveraging of local skills and workforces.

Three guiding principles could be employed to maximise community support, including consistent best practice guidelines, broad community advocacy and project-specific consultation.

Consistent best practice guidelines

Maintaining a consistent framework is important for developing large-scale industries.

Clear expectations from standardised guidelines encourages greater transparency and accountability in community engagement practices [22] (see below case study).

A set of consistent best practice guidelines established by industry and governments regarding community engagement could encourage and increase community involvement across the entire industry. These guidelines may be embedded across all bioenergy projects to enable project proponents to effectively engage with local communities at all stages of project development.

Furthermore, the Australian Hydrogen Council has identified the need to build a public understanding of, and exposure to, hydrogen as a new large-scale industry. It is developing a set of social licence principles to ensure the engagement of communities regarding concerns over land, water and safety are included consistently across industry and policy-making actions.

A link can therefore be drawn between the growing hydrogen and bioenergy industries, which similarly face a lack of public understanding and stand to benefit from consistent best practice principles to address community concerns.

Best practice guidelines may vary in form. They may include a set of short succinct principles similar to the Clean Energy Council's Best Practice Charter, or a more detailed set of tools and actions that different bioenergy project developers can utilise.

Whichever form guidelines may take, industry and government stakeholders are best placed to develop a national framework that outlines shared directions and principles to ensure community engagement and trust are included in developments across the entire industry.

Clean Energy Council's Best Practice Charter for Renewable Energy Projects

The Clean Energy Council established a Best Practice Charter for Renewable Energy Developments, which consists of ten principles that signatories are committed to upholding [24]. Similar broad standardised principles applied to the bioenergy industry would enable consistent community engagement practices across a wide range of bioenergy projects.

The Clean Energy Council's Best Practice Charter consists of principles that are broad in scope and are therefore suited to a range of industries including the bioenergy industry. For example, a key theme running throughout the principles is ensuring early and ongoing engagement with the local community takes place, including Traditional Owners of the Land. This includes providing transparent and timely information, seeking community input, incorporating local employment into developments, sharing benefits, and consulting the community on project closure decommissioning or refurbishment options [24].

On an industry-specific level, the Clean Energy Council has also established Common Practice Community Engagement Guidelines for the national wind industry [25]. The Guidelines were an initiative of nine wind development companies, and they set out principles and advice for action across six key stages of the wind farm lifecycle [25]. The Guidelines outline the objectives of community engagement and key steps for action at the following six stages of wind farm developments:

- Site selection
- Project feasibility
- Planning and approvals
- Construction
- Commissioning and operations
- Decommissioning

Broad community advocacy

Working within a consistent best practice framework, two levels of action can be taken to build community support: broader advocacy about the bioenergy industry and project-specific consultation with local communities.

Broad community advocacy was outlined during stakeholder consultations as a priority for gaining community support.

Given the bioenergy industry receives relatively less public attention compared to other renewable energy industries, the perceived negative impacts of bioenergy present a key impediment to its development.

Considering the multiple feedstock and end-use markets across the bioenergy sector, its complexity often amounts to a limited understanding amongst the general public.

Community advocacy can take the form of large-scale education campaigns and local community consultation processes to discuss public perceptions surrounding the bioenergy industry. The launch of 'European Bioenergy Day' is an example of a large-scale advocacy campaign while the Northern Rivers community engagement project in New South Wales is an example of a small-scale advocacy campaign (see below case study).

European Bioenergy Day Campaign

The European Biomass Association (AEBIOM), which represents over 30 national associations and 90 companies across Europe, launched a 'European Bioenergy Day' on 21 November 2017. The date was strategically chosen to demonstrate that the European Union's energy consumption could be solely powered by bioenergy from that day until the end of 2017 [26]. This large-scale awareness campaign demonstrates the significant contribution bioenergy can make to the European Union's broader energy transition.

The initiative won the 2018 European Association Award for Best Communications Campaign by an association with a secretariat consisting of over ten representatives [26]. It inspired countries within Europe to celebrate their own national 'Bioenergy Day' depending on the number of days each respective country could be solely powered by bioenergy. In 2018 Sweden was the first to celebrate its national Bioenergy Day on 18 August, Finland was second on 28 August, Latvia was third on 7 September, Estonia was fourth on 19 September and Denmark was fifth on 25 September [27].

The second annual European Bioenergy Day was successfully shifted two days earlier from 21 November 2017 to 19 November 2018 in response to the expansion of the industry [27]. AEBIOM plans to continue the initiative with an aim to shift the continent-wide date to October by 2030. This is an example of a creative target-setting strategy that will expand the industry's development while simultaneously raising awareness.

Northern Rivers BioHubs Consortium, New South Wales

Levels of community support for bioenergy on a broad level were obtained in north-east New South Wales by a community engagement study instigated by the Northern Rivers BioHubs Consortium and led by the local organisation Sustain Energy [28]. Interactive workshops were held to discuss the potential for local bioenergy projects, with participants completing an identical survey pre- and post-workshop.

In the surveys, participants were asked to rate their support out of a score of 10 for various bioenergy technologies. The outcomes revealed that anaerobic digestion was the most supported technology and municipal and agricultural waste were the most supported feedstocks, with bioenergy generally enjoying good support across all participants. The results further indicated that combustion was the least supported technology and forest residues and energy crops were the least supported feedstocks.

Although general support for bioenergy marginally declined in the post-workshop surveys, this suggests that these discussions and presentations were unbiased and well-balanced between benefits and concerns instead of being simply used as promotional tools. This is a key element for successful community engagement [28]. This study was effective in providing the basis for project development informed by community perspectives.

Table 2 – Northern Rivers Biohubs pre- and post-workshop survey results

Technology/feedstock		Mean level of support (0 = no support, 10 = complete support)	
		Initial surveys	Follow-up surveys
Technologies	Combustion	5.45	5.44
	Pyrolysis	7.33	7.08
	Anaerobic digestion	8.74	8.58
Feedstocks	Municipal waste	8.56	8.31
	Agricultural waste	8.64	8.17
	Forestry residues	7.14	6.41
	Energy crops	6.61	6.44

Project-specific community consultation

Project-specific consultation is integral to securing community support for bioenergy projects, with the potential for such consultations to be undertaken in a consistent manner across the industry.

Community support enhances project development at all stages from initial planning through construction and operation to closure. It also contributes to appropriate decisions around feedstock, technology and site location choices to ensure that project management takes all social and environmental implications into account [1].

Early community engagement is key to building a sense of shared ownership and decision-making and should be maintained throughout entire project lifecycles to keep communities informed and identify problems before they arise. This has been demonstrated through projects including the Australian Paper project described below and also the WtE projects underway in Western Australia at Kwinana and East Rockingham.

Poor community engagement can result in project proposal rejection, legal challenges, diminished workforce sizes and adverse social or environmental local implications. This has the potential to significantly impact the cost-competitiveness of bioenergy.

It is therefore important that a sense of shared decision-making and project ownership is achieved at the early stages of project development. This will ensure a wide range of potential problems and solutions are considered, and local knowledge and industry can contribute to best possible outcomes.

Community engagement can take place in many forms, including interactive workshops, pop-up information stalls, site open days, local community group staff membership, information and visitors' centres, websites and newspaper advertisements. For an example, see the Australian Paper case study below.

Australian Paper, Latrobe Valley (Victoria)

Australian Paper's WtE facility in Latrobe Valley is an example of successful community consultation that took place at the early stages of project development. Australian Paper is the largest industrial user of natural gas in Victoria. Its thermal combustion Waste to Energy plant will replace two existing gas-fired boilers and provide 225 MW of thermal energy directly to its Maryvale Pulp and Paper Mill [29]. Victorian Environment Protection Authority approved the proposal in 2018 and the plant is expected to open in 2024.

The success of the proposal can largely be attributed to the rigorous consultation process that took place beginning in 2017. Australian Paper has been operating in Latrobe Valley since 1937 and understands the importance of early community engagement.

An information centre and a project office were established in Morwell for local visitors over a year before the project's approval. Other consultation activities included a project website, regular stakeholder newsletters and local newspaper advertisements, pop-up information centres in Traralgon, Morwell and Moe, and a Maryvale Mill open day [29].

Feedback was encouraged throughout the activities and was condensed into a number of key concerns and questions that Australian Paper addressed.

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PRIMARY ROLES:

Enea Consulting led the research on markets, resources, production pathways and public policy.

Deloitte led the demand and economic scenario modelling, the stakeholder consultation and research on community support and benefits.



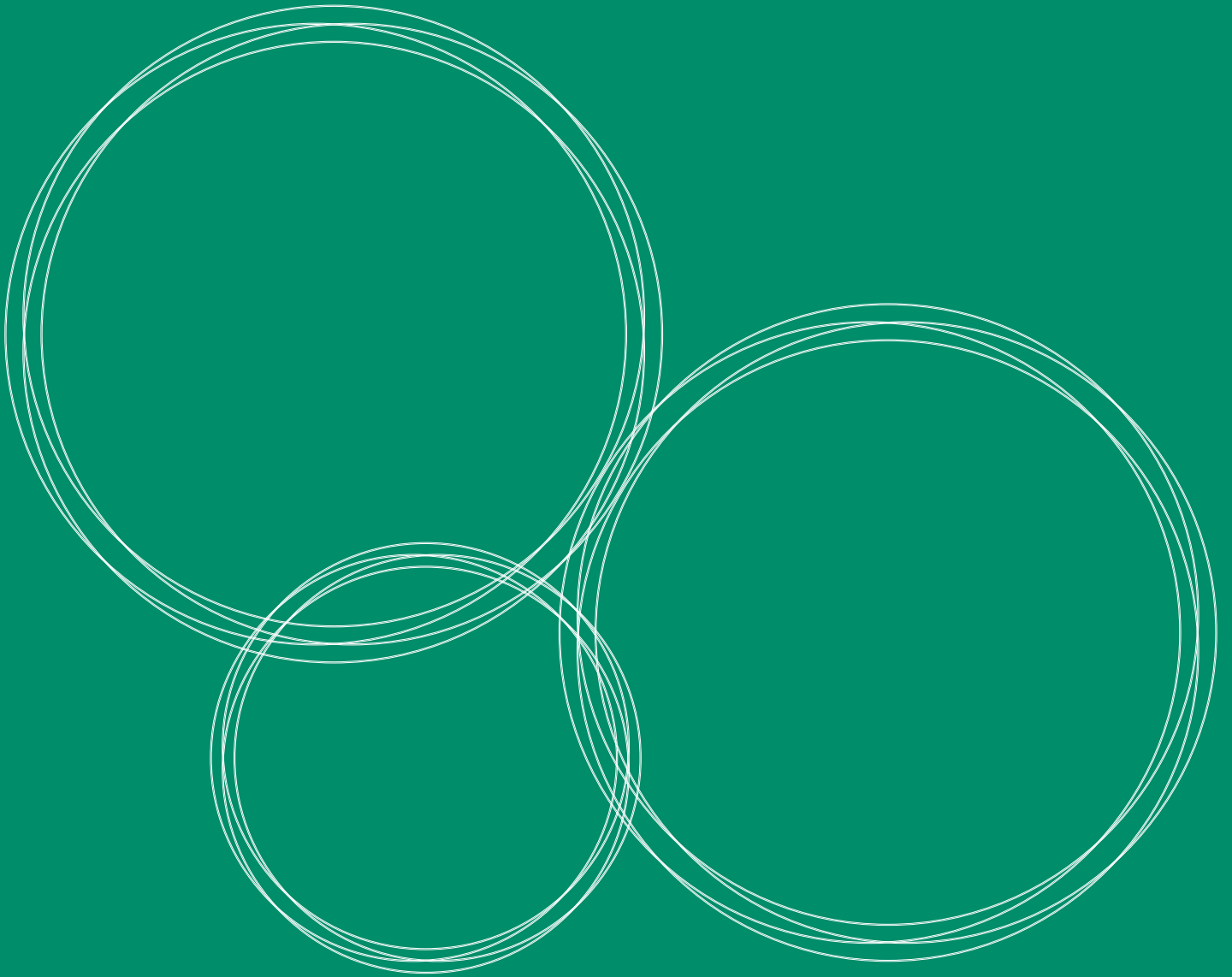
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