



WA Agricultural Research Collaboration

Innovation • Transformation • Growth

Perth Workshop Feedback Synthesis

WAARC Biofuels & Bio-based R&D Strategy

Research Packages workshop feedback, voting signals and discussion notes

30 September 2026

COMMERCIAL IN CONFIDENCE

Prepared by Spiegare Pty Ltd

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elucidating the how

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Prepared for WAARC, September 2026.

Cameron Begley, Managing Director

Spiegare Pty Ltd

ABN 41 602 009 316

Spiegare Pty Ltd

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Executive Summary

OVERALL WORKSHOP SIGNAL

The workshop did not invalidate the A–J architecture. It materially shifted the centre of gravity away from “more feedstock” and toward a systems proposition built around agronomic limits, sustainable mobilisation, regional logistics, data integrity, bankability, market pull and co-product value.

- **Western Australia has a credible opportunity to develop renewable fuel and bio-based industries by leveraging its agricultural production, biomass resources, regional infrastructure, research capability and substantial demand for liquid fuels.** However, the existence of feedstocks and available conversion technologies does not in itself establish a commercially viable industry. The key challenge is determining which combinations of feedstock, region, technology, infrastructure, carbon performance and market demand represent genuine areas of competitive advantage for WA.
- **The draft WA Biofuel and Bio-based R&D Investment Framework was developed to help WAARC address this challenge.** Rather than selecting individual technologies or projects, the framework provides a structured approach for identifying where targeted R&D investment can reduce critical uncertainties, establish the evidence required for commercial investment and ultimately leverage industry and government co-investment.
- A portfolio of R&D opportunities was developed spanning feedstocks, processing and conversion pathways, co-products, carbon and traceability, market demand and co-investment. The workshop tested and refined these opportunities and the prioritisation framework to inform where WAARC should invest, co-invest, coordinate or monitor. Outcomes were interpreted using both participant voting and workshop discussion, with voting treated as an indication of stakeholder support rather than a stand-alone investment ranking.
- **Package E (Residue thresholds)** was the clearest quantitative winner in the photographed voting: +63 FOR, -1 AGAINST, net +62. The discussion strongly supported establishing what can be sustainably removed, where, at what cost, and with what soil-carbon and nutrient consequences.
- **Package F (Biomass hubs)** also attracted very strong visible support with no AGAINST markers visible on the photographed sheet. Participants repeatedly linked hub design to regional development, collection radius, infrastructure, feedstock diversity, seasonality and bankability.
- **Package A (Oilseed intensification)** was presented a confounding result in its current framing: +16 FOR, -26 AGAINST, net -10. The issue was not a rejection of increased oil production *per se*; it was expressed as a resistance to achieving that increase by increasing canola acreage without fully resolving rotation limits, soil health, land-use change, CI, crushing economics and co-product markets. Increasing oilseed cropping by diversification of oilseed species would remain an option that avoids the canola over-cropping impacts. The reaction does not invalidate medium-long term strategies to increase oil outputs by intensifying oil concentration in canola seed or by producing biomass oil in crop residue on current crop acreage.
- **Packages B–D** remained investable as targeted, gated opportunities rather than assumptions: B net +21, C net +16 and D net +8 on the photographed vote sheets. Participants asked for

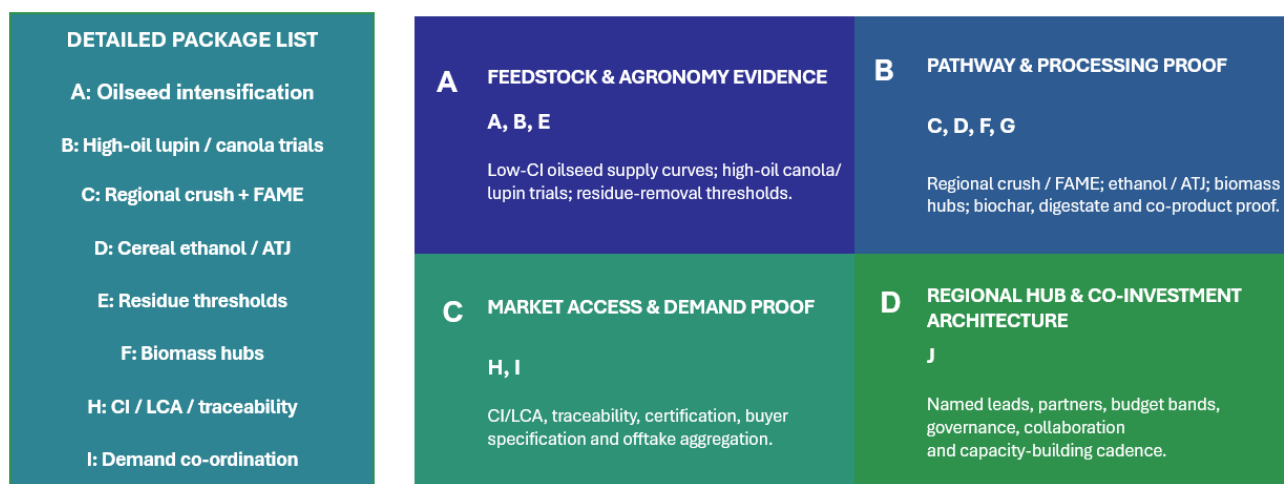
stronger evidence on profitability, volumes, midstream configuration, seasonal variability, social licence and alternative feedstocks/pathways.

- **Packages G–J** were generally treated as enabling architecture. The photographs show positive voting and no AGAINST stickers on the captured sheets, with repeated calls for co-product quality assurance, rigorous CI/LCA data, demand coordination, anchor offtake and a whole-of-system actor/co-investment map.

Four Portfolio Streams:

R&D Portfolio Narrowing: Converting detailed R&D packages into four streams

WAARC can take ownership of four anchor programs.



Recommended strategic readout

- **Elevate E (residue thresholds) and F (biomass hubs)** as core near-term WAARC research packages because they answer the foundational questions of sustainable resource availability and regional system configuration.
- **Treat H (CI/LCA & traceability) and I (demand coordination / offtake)** as cross-cutting enabling platforms that underpin bankability across the portfolio, even if they are less “physical” than feedstock or processing projects.
- **Reframe A** from “oilseed intensification” to “sustainable oilseed diversification and system optimisation”; explicitly cap ambitions by rotation, regional agronomy and land-use/CI constraints.
- **Keep B (high oil lupin/canola), C (regional crush and FAME), D (cereal ethanol/ATJ) and G (biochar, digestates & co-products)**, but gate them against commercial thresholds: feedstock volume, farmer margin, midstream capex, co-product markets, environmental performance, infrastructure and committed demand.
- **Use J (Actor map/co-investment)** as the delivery architecture rather than a stand-alone mapping exercise: define who must act, what each party must de-risk, and how public R&D and co-investment unlock private capital.

Background of organisations

Spiegare Pty Ltd

Spiegare is an Australian technology transfer and commercialisation advisory firm, which has since 2014, gathered a group of experts to deliver integrated advice and commentary on specific technology transfer opportunities, organisational innovation strategy, program management and specific technology – market trajectories. Spiegare delivers to research, investment and private-sector clients, with a particular strength in the bio-based economy including agriculture, plant sciences, biosecurity, entomology, industrial biotechnology and material sciences.

Cameron Begley Managing Director Spiegare Pty Ltd BEng(Chem)(Hons), MBA	Dr Faisal Younus Lead Business Development Consultant Spiegare Pty Ltd BSc(Biotech)(Hons), PhD
Dr Allan Green Managing Director AGRENEW Pty Ltd BSc(Agri (Hons), MSc(Agri), PhD, FAIA	Dr Melissa Straffon Director Melissa Straffon Consulting Pty Ltd BSc(MolBiol)(Hons), PhD, GAICD

WA Agricultural Research Collaboration (WAARC)

The WA Agricultural Research Collaboration (WAARC) brings together Western Australia's leading agricultural research organisations to address major challenges and opportunities facing the State's agricultural industries. Through collaborative research, shared capability and strategic investment, WAARC works to deliver practical outcomes that improve the productivity, profitability, sustainability and resilience of Western Australia's farming systems.

WAARC is leading the biofuels and bio-based R&D roadmap because many of the critical questions underpinning future biofuels and bio-based industries begin within agricultural systems. Feedstock supply, crop productivity, residue management, carbon intensity, soil health, logistics, regional infrastructure and grower participation are all areas where WAARC members possess extensive expertise and established research capability. At the same time, WAARC recognises that successful biofuel and bio-based industries require collaboration beyond agriculture, incorporating expertise in engineering, processing technologies, commercialisation, policy, certification and market development.

The workshop was an opportunity to bring together industry, government, researchers and end-users to help identify where Western Australia has genuine competitive advantages in renewable fuels and bio-based industries, and where targeted R&D investment can have the greatest impact. Rather than selecting a preferred technology or promoting individual projects, WAARC's objective is to develop a robust, evidence-based investment framework that identifies the research, demonstration and coordination activities required to accelerate commercially credible opportunities for Western Australia.

Background

Western Australia has a credible opportunity to develop renewable fuels and bio-based industries, supported by its agricultural and forestry resources, concentrated demand for liquid fuels, established infrastructure and strong research capability. This creates potential to generate new value from oilseeds, grains, crop and forestry residues and other biomass, while supporting regional development and the transition to lower-carbon fuels.

However, the opportunity is not yet sufficiently defined to support large-scale investment. The key gap is an integrated evidence base demonstrating which combinations of feedstock, region, conversion pathway, infrastructure, carbon performance and market demand can be commercially viable in WA. Feedstock availability alone does not establish an opportunity. Sustainable supply, delivered cost, logistics, processing scale, co-product value, carbon intensity and credible customer demand must align.

The draft WA Biofuel and Bio-based R&D Investment Framework and Opportunity Map was developed to provide WAARC with a systematic approach for addressing these uncertainties. Rather than selecting a preferred technology or commercial project, the framework identifies where targeted R&D can build shared evidence, resolve critical barriers and progressively de-risk the most promising opportunities.

The proposed approach is regional, staged and evidence-led. Opportunities move from foundational evidence through regional validation and market testing toward industry-led development, with larger investment contingent on defined evidence and commercial thresholds. This provides a basis for WAARC to determine where it should invest, co-invest, coordinate, monitor or avoid involvement, while positioning the strongest WA opportunities to attract future industry and government investment.

Purpose of the workshop

The stakeholder workshop was undertaken to test, validate and refine the draft WA Biofuel and Bio-based R&D Investment Framework and Opportunity Map before final recommendations are presented to WAARC.

The workshop brought together industry, research and other stakeholders to challenge the proposed R&D opportunities and assess whether the identified gaps and priorities reflect the practical requirements for developing renewable fuel and bio-based industries in Western Australia. It also tested whether the proposed prioritisation approach provides an appropriate basis for guiding future WAARC investment.

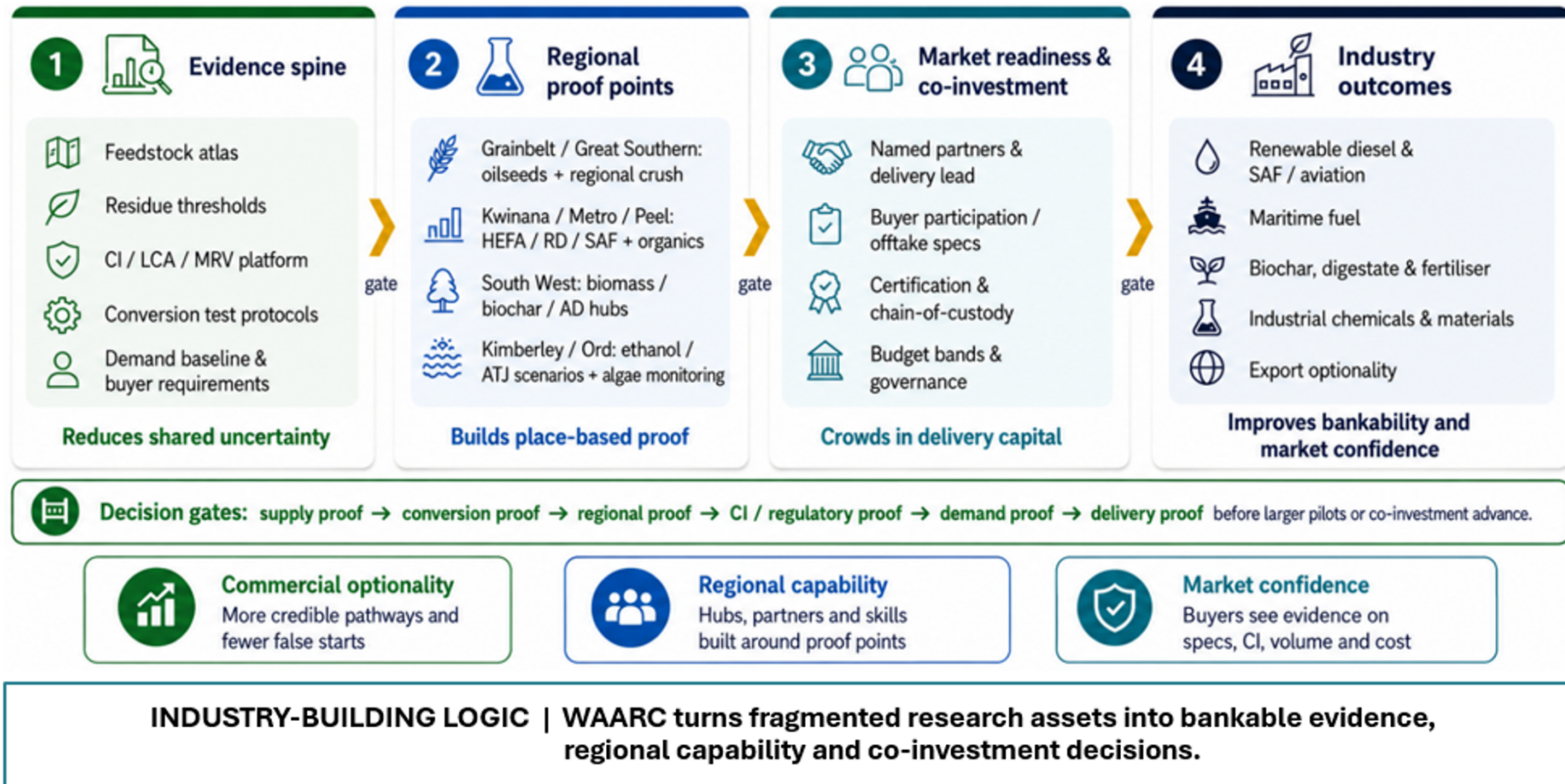
Specifically, the workshop sought to determine:

1. Have the right R&D opportunity areas been identified?
2. Are the identified R&D gaps genuine and important to WA?
3. Are the prioritisation criteria appropriate for guiding WAARC investment?
4. Which opportunities should WAARC prioritise, co-invest in, coordinate, monitor or not pursue?

The workshop was not intended to select a preferred technology or commercial project. Rather, it was designed to challenge the underlying assumptions, identify gaps and dependencies, and strengthen the evidence base used to prioritise future R&D investment.

Participant voting provided an indication of the relative level of support for each proposed R&D package, while facilitated discussion and workshop comments provided important context for interpreting those results.

WAARC R&D PORTFOLIO BUILDS THE EVIDENCE CHAIN



Evidence base and interpretation approach

Photographic evidence: The synthesis uses the expanded workshop photo set covering Packages A–J, including the voting grids and handwritten mind maps. Where a word or phrase was not sufficiently legible, it has been paraphrased only at the level that could be read with confidence; uncertain words have not been invented.

Voting evidence: Exact totals are reported below.

Interpretation: Each package section separates what was visibly raised from the strategic implication and the recommended response. This distinction matters because the workshop comments are evidence to refine the research design, not necessarily instructions to accept every individual suggestion.

Photographed voting signal

Package	Workshop title	FOR	AGAINST	Total votes cast	Signal
A	Oilseed intensification	16	26	42	Net -10; clear challenge to current framing
B	High-oil lupin/soybean/canola trials	26	5	31	Net +21; positive but viability-gated
C	Regional crush + FAME	16	0	16	Net +16; positive, but technology-lock-in concerns
D	Cereal ethanol/ATJ pathways	15	7	22	Net +8; mixed/conditional support
E	Residue thresholds	63	1	64	Net +62; strongest explicit vote
F	Biomass hubs	66	0	66	Net + 66; Very strong visible FOR pattern; no AGAINST markers visible
G	Biochar, digestate & co-product proof	35	0	35	Net +35; Strong visible FOR pattern; no AGAINST markers visible
H	CI/LCA & traceability	46	0	46	Net +46; Strong visible FOR pattern; no AGAINST markers visible
I	Demand coordination	27	0	27	Net +27; Positive visible FOR pattern; no AGAINST markers visible
J	Actor map & co-investment	20	0	20	Net +20; Moderate positive FOR pattern; no AGAINST markers visible

Important caveat: Voting intensity and strategic importance are not identical. Enabling packages such as H, I and J can still be indispensable for commercialisation.

Package A — Oilseed intensification

VOTE SIGNAL

+16 FOR / -26 AGAINST (net -10)
The only package with a strongly negative photographed net vote.

What participants wrote/raised

- Participants repeatedly asked for the proposition to go beyond canola: novel oilseeds for different environments were suggested, including carinata, sunflower and cottonseed.
- Existing industry know-how and established technology from seeding through to harvest were recognised as strengths, as were sovereign LCLF processing potential and existing market familiarity.
- The principal challenge was agronomic and environmental: soil acidity, soil health, disease pressure, biodiversity, eutrophication, long-term sustainability and the cumulative effect of increasing canola frequency.
- One handwritten comment placed an agronomic ceiling at roughly 30–40% of hectares allocated to canola in rotations. The board also queried whether intensification could affect soil biota over the long run.
- The sheet explicitly questioned the economics of major crushing/processing infrastructure and referenced capital costs above \$100 million, alongside subsidy dependence and the cost of canola oil as a fuel feedstock.
- Participants raised EU/RED sustainability and CI thresholds, land-use change, total CI methodology and whether WA canola can maintain market access as standards tighten.
- There was a clear co-product question: what happens to additional canola meal, and can the protein stream find adequate scale higher-value or alternative markets rather than automatically being treated as a 'given' credit?
- Consumer outreach and social licence were raised even where the technology risk is low.

What it means: The negative vote is best read as rejection of the word “intensification” when it implies simply allocating more hectares to canola. The room saw value in oilseeds, but wanted the business case constrained by rotation, environmental performance, regional agronomy, processing economics and real co-product demand.

Recommended response: Reframe A as “Sustainable oilseed diversification and system optimisation”. Make additional oil output a consequence of better genetics, regional fit, yield/oil-content improvement and diversified oilseed options — not a target based primarily on expanded canola area. Explicitly model rotation ceilings, soil effects, CI and meal-market capacity.

Package B — High-oil lupin / soybean / canola trials

VOTE SIGNAL

+26 FOR / -5 AGAINST (net +21)

Clear positive interest, with strong commercial and agronomic gates.

What participants wrote/raised

- Participants saw value in testing lupins and soybeans because of additional rotational benefits, especially nitrogen fixation and potentially lower nitrogen inputs/lower CI.
- The group recognised that WA growers already know and understand lupins, reducing adoption friction compared with a completely new crop.
- Key questions were genetic: what is the potential genetic gain for oil in lupin, can advanced breeding or GM accelerate the trait, and what should be learned from genetic improvement in canola?
- The central commercial concern was reliability: “Is the lupin crop reliable enough?” and what volume would be needed for a viable value chain.
- Participants asked whether the package should include other suitable high-oil legumes or oil crops rather than lock itself to lupin/soybean/canola only, noting no specific alternatives were nominated.
- Future-climate analysis was requested: how changing climate affects feedstock suitability and crop areas, with annual resource availability/remote-sensing data because planted areas vary year to year.
- The feedback noted that WA already has market bonification mechanisms that reward higher oil content, creating a plausible pathway for grower premiums if higher-oil traits are commercially valuable.
- Other agronomic benefits noted included improved rotation quality, soil productivity and soil health.

What it means: The workshop is supportive of B, but not because “high-oil lupin” alone is proven. It is supportive of the broader proposition that high-oil legumes could deliver both feedstock and farming-system value if trait performance, crop reliability and grower margin can be demonstrated.

Recommended response: Broaden B to “High-oil legumes and advanced oilseed genetics”. First, test whether the crop can reliably produce more oil, deliver a worthwhile premium to growers, achieve sufficient regional scale, and provide rotational benefits. Agro-climatic suitability and annual mapping of feedstock availability should also be built in from the outset.

Package C — Regional crush + FAME

VOTE SIGNAL

+16 FOR / 0 AGAINST (net +16)
Supported, but participants challenged
a FAME-only configuration.

What participants wrote/raised

- Participants asked which WA regions can genuinely support crushing facilities, with Esperance, Kwinana/industrial precincts and port-linked locations appearing in the discussion.
- The feedback asked for input-quality requirements, drivers of regional-crush success and whether the feedstock base is large and consistent enough to achieve economies of scale.
- A handwritten comment referred to commercial-scale throughput in the order of 500–600 ktpa, reinforcing the need to test how much canola is realistically available to a plant rather than assuming total production is accessible.
- “Not enough feedstock”, seasonality, poor seasons and plant cash flow were explicit concerns. Feedstock specifications and storage/inventory requirements were also raised.
- Infrastructure needs identified included power, gas/hydrogen, port liquid handling and meal handling.
- A key challenge was technology lock-in: “Why only FAME? Could the technology be diversified?” and the risk of stranded FAME assets if HEFA or other pathways scale.
- Mass-balance and blending rules, regulation and modular options were raised as important design variables.
- Meal specifications and the value of meal to livestock/regional diversification were raised as part of the plant economics, not as a secondary issue.
- One handwritten summary captured the decision frame succinctly: economics, technology, logistics and meal specification.

What it means: The room did not reject regional processing. It questioned the idea that a plant should be justified on a single conversion route without resolving feedstock variability, infrastructure, co-products and future technology risk.

Recommended response: Recast C as “Regional oilseed processing and flexible conversion”. Use FAME as one reference case, but compare modular/flexible configurations and future compatibility with HEFA or other downstream routes. Require a bankable regional feedstock envelope, port/utility analysis, meal market plan and downside case for poor seasons.

Package D — Cereal ethanol / ATJ pathways

VOTE SIGNAL

+15 FOR / -7 AGAINST (net +8)
Conditional support and the weakest positive
net vote among B–E.

What participants wrote/raised

- Participants asked whether farmers would need to change crops to meet demand and whether cereal ethanol/ATJ is the best marketable pathway for WA cereals.
- The room identified potential value in high-starch/lower-protein grain and specifically raised low-protein feed wheat on the southern coast as a research question.
- There was interest in extending value into livestock systems rather than treating fuel and feed as separate markets.
- Sweet sorghum was raised as a potentially more efficient carbohydrate feedstock because of high yield, lower land/fertiliser intensity and multiple product streams.
- Participants asked for comparison with other “drop-in” fuel pathways rather than assuming ethanol/ATJ is the preferred destination.
- Food-versus-fuel and social licence were explicit concerns.
- Seasonal conditions change grain protein and quality, creating inter-seasonal variability that a processor would need to manage.
- The feedback asked for long-term environmental cost/benefit analysis and socio-economic feasibility alongside process economics.

What it means: D should become a comparative carbohydrate-platform package rather than a defence of cereal ethanol. The workshop wanted to know which carbohydrate feedstock and midstream route provides a genuine WA advantage after accounting for quality variability, logistics, social licence and downstream market value.

Recommended response: Reframe D as “Cereal and carbohydrate pathways for low-carbon fuels”. Compare grain, sweet sorghum and other credible sugar/carbohydrate feedstocks against common metrics: farm margin, yield per hectare, water, inputs, CI, midstream requirements, product flexibility and regional infrastructure.

Further note: This is also the natural home for the additional workshop discussion on sugarcane, sorghum and sugar beet in WA/the Ord, subject to validating agronomy, water, infrastructure and the absence of an established WA sugarcane industry.

Package E — Residue thresholds

VOTE SIGNAL

+63 FOR / -1 AGAINST (net +62)
The strongest explicit vote in the photographed workshop material.

What participants wrote/raised

- Participants wanted safe harvest fractions by environment and region rather than a single WA-wide removal assumption.
- Regional residue-volume estimates were requested, together with long-term competing uses and the opportunity cost of diverting residue from the farming system.
- The central environmental issue was explicit: removing residues removes carbon and nutrients from soil. The economic value of that foregone fertility/soil function must be quantified for growers.
- Collection and distribution cost, on-farm economics, labour availability, storage and quality management were recurring implementation questions.
- Participants also identified possible agronomic benefits from selective residue removal, including lower disease pressure, reduced frost risk, lower non-wetting build-up and improved herbicide efficacy.
- New markets were seen as important: co-utilisation with woody feedstocks, industrial heat, cogeneration and residues as a stepping stone to liquid fuels through pyrolysis and other conversion routes.
- Several comments argued residues may create more value if converted into products such as biochar/wood vinegar and returned to agriculture, potentially improving yield/soil quality and creating carbon value.
- A useful warning on the sheet was that “residues” can be confused with “biomass”; purpose-grown biomass and crop residues should not be assumed to have the same economics or sustainability profile.

What it means: E resonated because it asks a foundational question before infrastructure is built: how much material is truly, sustainably and economically mobilisable? This directly responds to the room’s concern about false economies and protects the strategy from treating gross residue production as available feedstock.

Recommended response: Elevate E as a flagship first-tranche package. Build region-specific removal thresholds, dynamic residue mapping, soil carbon/nutrient opportunity-cost accounting, alternative-use valuation and farm-level collection economics. Link it directly to F (hub design), G (co-product/biochar value) and H (CI/LCA).

Further note: The strong vote is consistent with the wider workshop preference for system evidence and bankability before large capital commitments.

Package F — Biomass hubs

VOTE SIGNAL

Very strong visible FOR pattern;
photographed AGAINST grid is empty.

What participants wrote/raised

- Regional jobs, workforce/skills, local development and economic diversification were prominent benefits.
- Participants repeatedly emphasised collection radius and transport economics. The economics of a hub depend on where aggregation stops being cheaper than decentralised/distributed preprocessing.
- For canola, ports were discussed as logical aggregation/processing nodes because seed already moves there and oil/meal may need export access.
- Different feedstocks may need different architectures: small regional preprocessing for lignocellulosics, aggregation for grains and rapid processing for sugar-rich feedstocks.
- Critical infrastructure raised included roads, utilities/electricity, storage, logistics and downstream processing/fermentation infrastructure.
- The feedback questioned who funds enabling infrastructure and who carries build-out/maintenance risk.
- Technology comments included steam explosion/hydrolysis, densification of bulky feedstocks and flexible pretreatment/conversion platforms.
- Location planning needs to reflect the expected life of assets and the risk that climate or industry change alters future feedstock availability.
- Seasonality, storage and feedstock diversity were repeatedly raised as ways to improve asset utilisation.
- Participants wanted scale, environmental impact and long-term viability considered before committing to a particular hub model.

What it means: F is not simply a proposal to “build hubs”. The workshop is asking for network optimisation: which functions are centralised, which are decentralised, what is the economic collection radius, and which locations remain robust across feedstocks and seasons.

Recommended response: Elevate F as the second flagship first-tranche package. Model hub-and-spoke configurations by region and feedstock, including port-linked and inland models; explicitly price roads, utilities, storage, preprocessing, labour and seasonal utilisation. Use bankability and resilience as design criteria, not just lowest theoretical logistics cost.

Further note: The workshop’s positive response to the regional narrative is a material strength. The regional frame should remain central to the final WAARC strategy.

Package G — Biochar, digestate & co-product proof

VOTE SIGNAL

Strong visible FOR pattern;
photographed AGAINST grid is empty.

What participants wrote/raised

- Participants asked for regulatory systems and quality assurance so products such as biochar and digestate can be trusted and consistently specified.
- The feedback distinguished low-value bulk products from higher-value secondary products. Extracting nutrients to higher concentrations can require significant capital and must be justified by end-market value.
- Digestate treatment/handling was questioned because in some systems it can be treated as a waste, creating spreading, composting or transport costs.
- Input quality was described bluntly as “garbage in, garbage out”; contaminants and feedstock consistency therefore matter to product quality and investor risk.
- PFAS/PFOS and microplastics were raised as contaminant/destruction questions that could affect acceptance and regulation.
- Participants asked for product-market intelligence and adoption pathways rather than assuming a co-product market exists.
- High-value biochemical opportunities were raised, including sustainable fermentation platforms and secondary products such as biopolymers and pigments.
- The group cautioned that co-product complexity can add investor risk; the main business case should not depend on speculative high-value products unless markets and specifications are proven.
- Scale and long-term economic/environmental viability were identified as necessary proof points.

What it means: G is a commercial de-risking package: it converts “co-product credits” in techno-economic models into evidence about specification, contamination, regulation, price and absorptive market capacity. This is especially important because the workshop repeatedly challenged whether protein meal and other co-products can actually clear the market at assumed values.

Recommended response: Reframe G as “Circular co-products and environmental co-benefits”. Prioritise a small number of credible products and prove quality standards, contaminant limits, end-user demand, logistics and net value. Treat higher-value biochemical products as optional upside, not as the base-case economics.

Further note: This package should explicitly connect to the environmental-markets discussion raised by the ANZ financier: biochar/soil carbon value can be tested, but only where backed by rigorous LCA, permanence and market rules.

Package H — CI / LCA & traceability

VOTE SIGNAL

Strong visible FOR pattern;
photographed AGAINST grid is empty.

What participants wrote/raised

- Data quality and reliability dominated the sheet: “garbage in, garbage out” was written directly against the need for valid, reliable inputs.
- Participants called for standardisation of calculation methodologies and alignment with recognised frameworks rather than bespoke WA calculations that markets may not accept.
- The package should consider full end-to-end processes, not farm-gate CI alone.
- Land-use change and indirect land-use change were explicitly raised in CI calculations.
- Environmental assessment was broadened beyond carbon to water, land, nature and ecosystem perspectives.
- Socio-economic and regional-WA considerations were requested alongside environmental metrics.
- The feedback asked that compliance burden on WA growers be limited and that existing datasets/CSIRO work be leveraged rather than duplicated.
- Climate variability matters because a low-CI feedstock is not useful if a poor season materially reduces availability.
- Data gaps were noted for newer crop systems, and participants raised the need for an underlying data bank/methodology capable of predicting feedstock CI/LCA.
- Farmer incentives and education were raised, including how practices that improve CI or carbon sequestration can be measured and rewarded.

What it means: H emerged as core market infrastructure. Without credible, standardised and low-burden data, WA cannot demonstrate lower CI, access premium markets, support financing or distinguish genuine environmental value from a false economy.

Recommended response: Elevate H from an analytical workstream to a cross-cutting “WA low-carbon feedstock data, CI/LCA and traceability platform”. Build on existing methods and market standards; define minimum datasets, calculation governance and interoperability. Link H to annual feedstock mapping and the environmental/land-use questions raised across A, B and E.

Further note: This directly answers the workshop discussion about data aggregation/collection and the financier’s environmental-impact question.

Package I — Demand coordination/buyer specifications & offtake

VOTE SIGNAL

Positive visible FOR pattern;
photographed AGAINST grid is empty.

What participants wrote/raised

- Participants asked who the demand actually comes from, which products buyers want and which markets — domestic or international — will accept them.
- Hard-to-abate demand was identified around mining, marine and aviation, with fuel security/sovereign supply appearing as part of the value proposition.
- Anchor users were proposed to establish demand, including mining and the public sector.
- Government levers raised included mandates, blending mandates, carbon credits/regulation and policy settings at international, national and state levels.
- One handwritten suggestion was a state-backed central buyer/offtaker capable of providing commitments large enough to make projects bankable, with Singapore noted as an example of the type of mechanism to consider.
- The feedback asked how much fuel WA itself can realistically consume and whether local consumption would be large enough to make an impact.
- Strategic market-access planning, certification requirements and acceptance in international markets were explicitly raised.
- Participants also asked about imports, onshore supply chains, local fuel security and the risk/benefit of directing product to domestic consumption.
- A cross-cutting data request was for an overarching system/dashboard to support planning and capture market-demand information.

What it means: I is the bridge between technical feasibility and financeability. The workshop repeatedly returned to “who buys, at what specification, at what price, for how long?” — exactly the questions that determine whether midstream and hub infrastructure becomes bankable.

Recommended response: Keep I, but sharpen it to “Demand coordination, specifications and bankable offtake”. Segment demand by mining, defence, aviation, marine, heavy transport and export markets; define product/certification requirements; test anchor-demand mechanisms and the role of government procurement/mandates without assuming subsidy dependence.

Further note: The repeated workshop emphasis on marketability, bankability and cost basis makes I a core enabling package, not a downstream add-on.

Package J — Actor map & co-investment

VOTE SIGNAL

Moderate positive visible FOR pattern;
photographed AGAINST grid is empty.

What participants wrote/raised

- The workshop map included growers/grower groups, NRM groups, processors, transport and storage companies, ports/rail, fuel users, policymakers, communities, private investors and state/Commonwealth government.
- Fuel users explicitly listed included mining, defence, transport and aviation.
- Participants raised community acceptance of regional transitions, planning/land activation, local labour, jobs, housing, health and social services.
- The group asked for a long-term context: which actors need durable contracts and what is required to enable investment over a project life rather than a short grant cycle.
- R&D, pilots/scale-up, de-risking and continuous improvement were placed alongside commercial actors, indicating that research translation is part of the system map.
- Policy makers were seen as providers of data, enabling policy and potentially funding/subsidy where justified; private sector actors were expected to carry commercial discipline.
- A real-time or continuously updated system map was suggested so the actor landscape remains useful rather than becoming a static stakeholder list.
- The notes also point to sequencing: bio-industry/feedstock, fermentation/technology and refinery/international partnerships need to connect rather than develop independently.

What it means: J is valuable when it moves beyond stakeholder mapping into transaction design. The system needs clarity on who supplies feedstock, who aggregates risk, who buys product, who finances infrastructure, who owns data/certification and who carries community/regional-development obligations.

Recommended response: Recast J as “Delivery architecture and co-investment pipeline”. For each priority project, identify the minimum actor coalition, unresolved risk owner, commercial decision point and plausible public/private co-investment instrument. Use J to convert the strategy into investable project formation.

Further note: Because the workshop repeatedly praised the bankability narrative, J can become the mechanism that links the research portfolio to financiers rather than remaining a conventional actor map.

Further notes from workshop discussion

Alternative carbohydrate crops and the Ord

- There was discussion about whether WA could grow sugarcane, sorghum and sugar beet, potentially in the Ord. A participant referred to research trials that had reportedly shown some success.
- The immediate question was not simply agronomy but the missing midstream: what processing configuration converts these crops into an investable low-carbon fuels pathway?
- The room recognised that WA does not currently have a sugarcane industry. Participants were open to exploring one, but treated it as a greenfield proposition whose agronomy, water, logistics, processing and economics remain to be demonstrated.
- Strategic implication: D should compare carbohydrate systems rather than assume cereals are the only or best route. Any Ord proposition should be treated as a gated regional case study, not as a strategy assumption.

Canola, food / fuel and farmer value

- Canola attracted substantial discussion. Participants repeatedly asked what incremental benefit accrues to farmers and whether the price/premium is sufficient to change behaviour.
- Questions were raised about whether Australia produces enough canola to make a material contribution to fuel security and what diverting additional oil to fuels could mean for food/export markets.
- The challenge was framed as opportunity cost rather than a binary food-versus-fuel debate: how much additional oil can be produced or redirected without eroding existing high-value markets, rotations or soil performance?
- Strategic implication: any canola fuel case should show the grower value proposition, realistic accessible tonnes, export/food displacement sensitivity and the role of co-products.

Protein meal / feed-market capacity

- There was extended discussion about canola meal and the protein stream created when more oilseed is crushed. The room questioned whether sufficient market depth exists to absorb additional meal at the prices assumed in business cases.
- Workshop discussion referenced a relatively concentrated export market, including China and Vietnam and pig-feed applications. Participants were concerned about dependence on a small number of outlets.
- There was also consensus that additional feed markets may need to be deliberately developed, including stronger domestic/regional livestock demand and differentiated feed specifications.
- Strategic implication: meal cannot be treated as an automatic co-product credit. C and G need explicit market-depth, specification, price and downside scenarios for protein meal.

Data aggregation and the “systems approach”

- Participants were supportive of the systems approach presented in the report: linking feedstock, logistics, processing, markets, CI and regional development rather than assessing technologies in isolation.
- A repeated concern was the fragmented data base: crop areas, residues, CI, feedstock availability, environmental metrics, infrastructure and market demand are held in different places and update at different frequencies.
- Strategic implication: H should become the common evidence layer, potentially combining annual spatial feedstock intelligence with CI/LCA, traceability and commercial planning inputs.

Finance, bankability and environmental markets

- A financier asked specifically about environmental impacts and environmental markets, including the extent to which environmental value could support or alter a project business case.
- The workshop responded positively to the report’s regional framing and bankability narrative. However, cost basis, marketability and bankability were recurring challenges throughout the session.
- Participants wanted to understand whether environmental benefits are real, measurable and monetisable — and equally whether environmental liabilities such as soil acidification, carbon loss or land-use change make some fuel propositions a false economy.
- Strategic implication: every priority package needs a common bankability screen: feedstock cost, capital intensity, utilisation, offtake, co-product value, environmental performance, policy dependence and downside resilience.

Land use, soil acidification and multiple agronomic zones

- Participants questioned how land-use change interacts with WA’s multiple agronomic zones and whether a single feedstock strategy can be applied across materially different farming systems.
- Soil acidification, crop/tree interactions and broader environmental impacts were repeatedly raised. The concern was that a fuel pathway can look attractive at plant gate while creating unpriced agronomic or environmental costs upstream.
- Strategic implication: A, B, E and H should use regional agronomic archetypes and explicitly include soil, nutrient and land-use effects in the business case.

Lupin enthusiasm — with viability gates

- The room showed clear interest in lupin, but repeatedly returned to the same questions: is the crop reliable, can higher oil content be delivered, what volume is needed, what price reaches the farmer, and does the resulting chain remain profitable?
- Strategic implication: B is a credible R&D opportunity precisely because these uncertainties remain resolvable through targeted genetics, agronomy and market work. It should not be presented as already commercial.

Cross-cutting messages from the workshop

- 1. Gross feedstock is not bankable feedstock:** Across crops and residues, the room repeatedly distinguished theoretical tonnes from tonnes that are sustainably available, regionally accessible, competitively priced and reliable enough to underpin infrastructure.
- 2. Bankability is the unifying decision criterion:** Cost basis, marketability, offtake, utilisation, co-products and downside cases appeared across almost every package. This supports retaining the strategy's commercial lens and making it more explicit.
- 3. Agronomy is a hard constraint, not a background variable:** Rotation ceilings, soil acidity, nutrient removal, disease, climate variability and land-use change determine how much supply can be mobilised. The strategy should not solve processing economics by assuming the farming system can expand indefinitely.
- 4. Co-products can make or break the economics:** Meal, biochar, digestate and other products need real specifications and markets. They can add value, but they can also become disposal costs or create market saturation.
- 5. Technology flexibility is preferred to lock-in:** Questions such as “why only FAME?” and whether cereal ethanol is the best pathway show that WAARC should research platform flexibility and system options rather than prematurely pick a single conversion technology.
- 6. Regional architecture is a strategic advantage:** Participants liked the regional approach, but want it operationalised through collection radii, ports, utilities, workforce, roads, storage, community impacts and long-term asset utilisation.
- 7. Data integrity and aggregation are enabling infrastructure:** CI, LCA, traceability, annual feedstock mapping and market information need a common evidence layer. Poor data directly weakens certification, environmental claims and investment decisions.
- 8. Market pull must be designed early:** Anchor buyers, specifications, certification, government policy and hard-to-abate demand should be developed in parallel with feedstock and processing research — not after a plant concept is selected.
- 9. Environmental value must survive full-system accounting:** The workshop was receptive to carbon and environmental markets, but equally alert to false economies. Soil carbon loss, acidification, water, land use and biodiversity need to sit inside the investment case.
- 10. The portfolio needs sequencing:** The strongest message is to establish sustainable supply (E), regional system architecture (F), evidence/CI (H) and demand (I), then use those foundations to de-risk more specific feedstock/processing opportunities.

Recommended refinement to the A–J architecture

Package	Current workshop label	Recommended refinement	Role in portfolio
A	Oilseed intensification	Sustainable oilseed diversification & system optimisation	Reframe/narrow; gated by agronomy and markets
B	High-oil lupin/soybean/canola trials	High-oil legumes & advanced oilseed genetics	Targeted R&D opportunity
C	Regional crush + FAME	Regional oilseed processing & flexible conversion	Commercial/midstream gate
D	Cereal ethanol/ATJ	Cereal & carbohydrate pathways for low-carbon fuels	Comparative pathway R&D
E	Residue thresholds	Sustainable residue mobilisation & value optimisation	Flagship foundational package
F	Biomass hubs	Regional biomass logistics, preprocessing & hub optimisation	Flagship regional systems package
G	Biochar/digestate & co-product proof	Circular co-products & environmental-value proof	Co-product/circular-economy de-risking
H	CI/LCA & traceability	WA low-carbon feedstock data, CI/LCA & traceability platform	Cross-cutting enabling platform
I	Demand coordination	Demand coordination, specifications & bankable offtake	Cross-cutting commercial platform
J	Actor map & co-investment	Delivery architecture & co-investment pipeline	Implementation/transaction design

Suggested sequencing

Foundation	E Residue thresholds + F Biomass hubs + H CI/LCA/data + I Demand coordination
Opportunity modules	B high-oil legumes, C regional processing, D carbohydrate pathways and G co-products—progressed where the foundation packages demonstrate a viable regional system
Reframed A	Continue oilseed work, but as a constrained optimisation/diversification problem rather than an acreage-expansion proposition
Delivery layer	J turns the preferred regional opportunities into coalitions, co-investment structures and project pipelines

BOTTOM LINE

The workshop strengthens the WAARC strategy if the feedback is used to sharpen sequencing and proof requirements. The proposition is not simply to grow more feedstock; it is to identify the WA combinations of feedstock, agronomy, logistics, processing, markets and environmental performance that are sustainably scalable and financeable.



