ARKHITEKTON
ENERGY
The Arkhitekts of Global Change

RENEWABLE ETHANOL · 25 TO 100 MILLION LITRES A YEAR

Arkhitekton Energy Bioethanol

Fuel-grade ethanol from agricultural residues and organic waste, for E10 petrol blending – with high-purity biogenic CO2 and animal feed as co-products. Fully funded, in a joint venture with the host site.



25–100 m
litres of ethanol a year

3
products – ethanol, CO2, feed

85%
of build funded by the EPC partner

£0
capital from the host

THE TECHNOLOGY

What a bioethanol scheme looks like

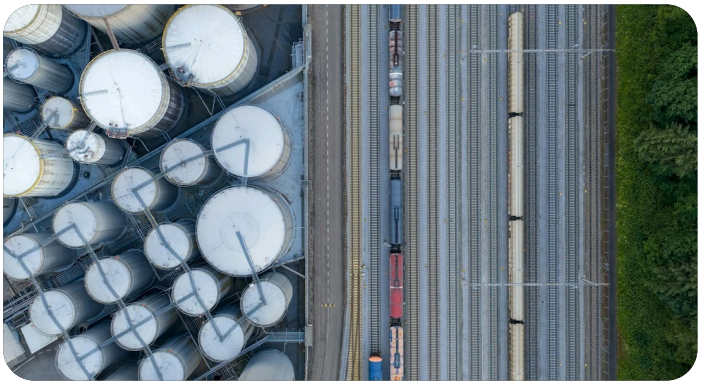
The technology we fund, build and operate – and how a typical Arkhitekton Energy scheme is laid out on site.



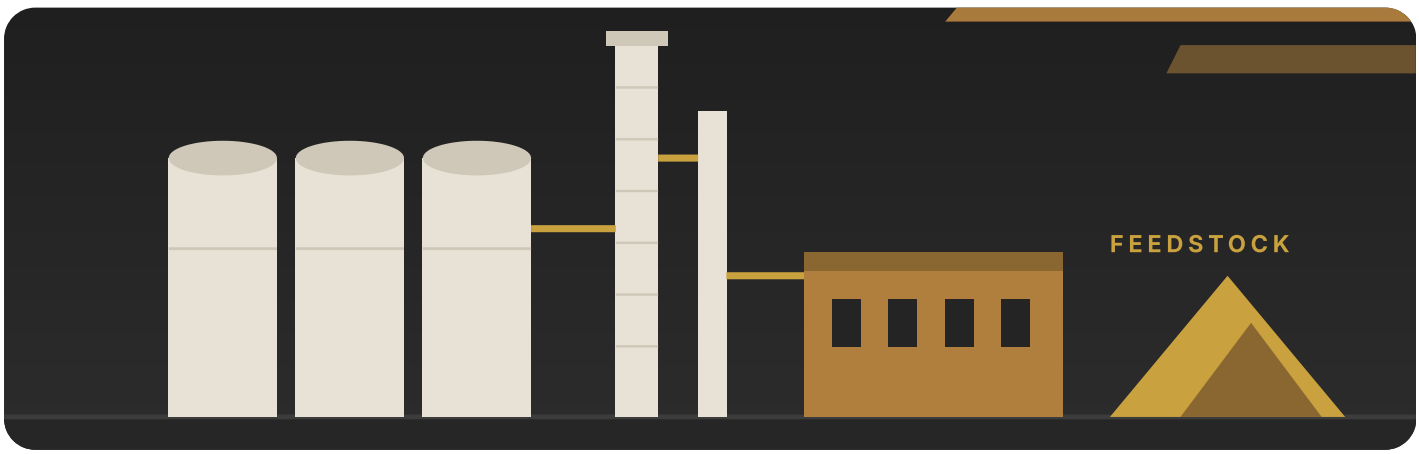
Harvesting crop residues and feedstock



Fermentation tank hall



Tank farm with rail dispatch



Typical bioethanol scheme layout – Arkhitekton Energy illustration

WHY BIOETHANOL, WHY NOW

Waste-based fuel for every petrol car

E10 petrol – up to 10% ethanol – has been the UK standard grade since September 2021. Under the Renewable Transport Fuel Obligation, fuel made from wastes and residues earns double the certificates of crop-based fuel. That makes waste-derived ethanol the most valuable route.

E10
UK standard petrol grade since 2021

2×
RTFO certificates for waste-derived fuel

~0.75 kg
of biogenic CO2 per litre of ethanol

20 yrs
project term

What makes the Arkhitekton approach different

- **Fully funded** – our EPC partner finances 85% of the build; the 15% balance is guaranteed
- **Joint venture with the landowner** – a 50/50 project company, land secured at Heads of Terms
- **Fixed-price turnkey EPC** with a UK Tier 1 civils partner and a full bond package
- **Waste-first feedstock** – residues and organic waste that earn double-counted certificates

Who it is for

- **Arable estates** with straw and crop residues
- **Food and drink producers** with sugary waste
- **Fuel suppliers** needing RTFO certificates
- **CO2 users** – food, drink and greenhouses

THE ARKHITEKTON FUNDING MODEL

85%
of the build financed by our EPC partner

15%
from a UK funding partner, guaranteed in full

50/50
joint venture with the landowner

£0
capital or borrowing for the landowner

For the landowner

Long-term, index-linked rent and half the profit – with no capital, no borrowing and no development risk.

For funders

Fixed-price EPC, URDG 758 guarantees, insurance and step-in rights – structured for institutional due diligence.

For offtakers

Waste-derived ethanol and RTFO certificates for fuel suppliers, plus food-grade CO2 and animal feed.

Sources: UK RTFO guidance; E10 introduced September 2021. CO2 yield is the theoretical fermentation ratio.

THE RANGE

First- and second-generation ethanol

We design each plant around the feedstock the host can supply, with second-generation residues and waste the priority.

Plant	Ethanol a year	Feedstock a year	CO2 a year	Typical host
Residue plant	25 m litres	~90,000 t residues	~19,000 t	Arable estates
Regional plant	**50 m litres**	**~175,000 t mixed**	**~37,000 t**	**Agri-food clusters**
Industrial plant	100 m litres	~350,000 t mixed	~75,000 t	Ports and industrial sites

Inside every project

PRE-TREATMENT

- Milling and steam treatment
- Enzymes release sugars
- Handles straw and husks

FERMENTATION

- Yeast converts sugar to ethanol
- Biogenic CO2 captured
- Continuous operation

DISTILLATION

- Fuel-grade anhydrous ethanol
- Heat integration
- Storage and loading

CO-PRODUCTS

- Food-grade CO2
- Animal feed
- Biogas from residues

From feedstock to fuel-grade ethanol

1. **Feedstock**
   Residues and waste received and stored.
2. **Pre-treat**
   Fibre broken down into fermentable sugars.
3. **Ferment**
   Yeast turns sugar into ethanol and CO2.
4. **Distil**
   Ethanol purified to fuel grade.
5. **Dispatch**
   Ethanol to blenders; CO2 and feed sold.

SITING AND THE LANDOWNER

Built where the feedstock is

Feedstock is the largest cost, so plants are best built close to it – on arable estates, agri-food sites or at ports – with road or rail access for fuel dispatch.

Arable estates

Straw and crop residues within about 50 miles of the plant.

Agri-food sites

Breweries, distilleries and food plants with sugary waste.

Ports and industry

Access to imported residues and fuel distribution.

What we look for

Criterion	What works	Why it matters
Feedstock	Contracted supply for 10+ years	Underpins funding and certificates
Area	5–15 ha	Storage, process plant and tank farm
Transport	Road, rail or port access	Feedstock in, ethanol out
Utilities	Gas or CHP, water and grid	Steam and power for the process
Land use	Industrial or agricultural	Permits and planning

The joint venture with the landowner

- **Heads of Terms early** – land secured by lease or purchase before the project is funded
- **50/50 project company** – the landowner and Arkhitekton Energy share net cash after costs, debt and tax
- **Site rent**, index-linked, from the start of construction
- **Feedstock income** – the host can sell residues to the plant

Planning and consents

- Planning permission
- Environmental permit
- Hazardous substances consent and COMAH where thresholds are met
- RTFO and ISCC sustainability certification
- Water abstraction and discharge consents

FUNDING AND RETURNS

85% EPC finance, 15% equity, 50/50 with the landowner

The same funding model as every Arkhitekton Energy programme. Our EPC partner finances 85% of the project cost, repaid from project revenue. The remaining 15% is provided by a UK funding partner and covered in full by an advance payment guarantee.

Size	Project cost	EPC finance (85%)	Equity (15%)	Value to landowner a year	Landowner share, 20 yrs
25 m litres/yr	£50.0m	£42.5m	£7.5m	£0.39m	£33.0m
50 m litres/yr	**£90.0m**	**£76.5m**	**£13.5m**	**£1.16m**	**£71.2m**
100 m litres/yr	£175.0m	£148.8m	£26.2m	£2.49m	£144.4m

50 m litres/yr – first full year of operation

£47.5m
revenue

£9.80m
EBITDA after feedstock and operating costs

£7.88m
EPC finance debt service

£1.92m
net cash, split 50/50

~23%
equity IRR, payback ~6 years

What the landowner receives

- **50%** of net distributable cash every quarter, open-book
- **£0.20m a year** site rent, index-linked
- Cash share rises to about **£7.39m a year** on a 50 m litres/yr once the EPC loan is repaid
- **Feedstock sales** – residues bought from the host at an agreed price
- No capital, no borrowing, no development risk for the landowner

Protections

- Fixed-price turnkey EPC with a UK Tier 1 civils partner
- **URDG 758** advance payment guarantee covering the 15% in full, plus performance (10%) and warranty (5%) guarantees
- Contractors' all-risks and third-party liability during the build
- Funders' step-in rights and a decommissioning reserve from year 10
- Option for the landowner to buy the plant at market value at the end of the term

Indicative base case: revenue £0.95 per litre including ethanol, RTFO certificates, CO2 and feed; costs £0.75 per litre; 20-year term. EPC finance 6% over 15 years; costs and revenue indexed at 2.5% a year. Subject to survey, planning, grid and offtake contracts.

EPC AND DELIVERY

Built turnkey, run by a UK operator

One fixed-price contract covers feedstock handling, pre-treatment, fermentation, distillation, tank farm and utilities. UE Series CHP can supply the plant's steam and power.

EPC partner

China Haisum Engineering, part of China Poly Group and our primary EPC partner, designs, procures, builds and commissions the plant on a fixed-price turnkey contract – and provides 85% of the project finance.

UK Tier 1 civils partner

Groundworks, foundations, access, drainage, HV works and grid connection, built to UK standards inside the EPC contract price.

UK operator

A UK operator runs the plant with a site team, laboratory and certification manager, under long-term feedstock and offtake contracts.

How a site is delivered

1. **Survey** – Feedstock, site, utilities and transport screen.
2. **Contract** – Heads of Terms, JV, feedstock and offtake.
3. **Consent** – Planning, permits and certification.
4. **Build** – Process plant and tank farm – about 18–24 months.
5. **Operate** – Ethanol, CO2 and feed sold; income shared.

Performance guaranteed

- Yield and throughput guaranteed at performance testing
- Process licensor warranties
- Feedstock and offtake contracts in place before close
- Certification audited every year

Reporting

- Live dashboards for the landowner, funders and offtakers
- Quarterly open-book management accounts for the project company
- Annual independent performance and ESG audit
- Lender-pack reporting to institutional standards

TYPICAL PROGRAMME

3–4 years to operation

From signed Heads of Terms. Grid connection dates are set by the network operator and can extend the programme.

NEXT STEPS

Turn residues into renewable fuel

Send us your site's location and the residues or waste you produce or can source. We will come back with a feedstock screen and an indicative plant size.

1
Site screen
Land, grid headroom, planning status and feedstock supply and transport.

2
Heads of Terms
Lease or purchase agreed and the joint venture with the landowner signed.

3
Pre-app and grid
Planning pre-application, permits and network operator connection offer.

4
Sign and close
EPC contract, funding and guarantees in place; build starts.

Who we are looking to hear from

- Arable estates and farming groups
- Food and drink producers with organic waste
- Fuel suppliers and blenders
- Industrial sites and ports with space and utilities

Also from Arkhitekton Energy

- **UD Series** modular Data Centres, 250 kW to 2 MW
- **UE Series** gas turbine generators, 2 MW to 112 MW
- **Waste to energy** – CFH green methanol, plastic recycling and EfW
- Solar, battery storage, wind, floating solar, hydro, hydrogen, bioethanol and biomass

Talk to Arkhitekton Energy

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All figures are indicative and do not form an offer or a financial promotion. Projects are subject to survey, planning, grid connection, funder approval, contract and financial close.