



COCOA POD HUSKS COULD SUPPLY THREE TIMES EDWENASE'S HOUSEHOLD ELECTRICITY DEMAND, GHANA

Fuel characterisation and community-scale electricity potential assessment in the Ashanti Region

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MEDIUM



TAKE-HOME MESSAGE

- Cocoa pod husks from Edwenase could generate 80,772 kWh of electricity per year — over three times the community's estimated annual household demand of 24,300 kWh.
- Good bio-solutions need sound economics, not just sound science.

THOUGHT BUBBLE 1

If Cocoa pod husks can generate 3.3 times Edwenase's household electricity demand, what prevents this agricultural waste from becoming a community-owned energy resource?

WHY THIS MATTERS

- Rural energy poverty remains a challenge in Ghana (Nyasapoh et al. 2022).
- Cocoa pod husks are abundant agricultural residues with no organised local residue-management system (Cho et al. 2020).
- Converting this biomass to electricity could address waste disposal and local energy access together (Fatma et al. 2018).



Fig.1 Edwenase in the Ejisu-Juaben District, Ashanti Region (Wiafe & Asamoah 2018)

STUDY AREA & METHODS

Edwenase • 442 residents • >100 households

- COCOA PRODUCTION DATA**
2019–2024 production records
- SAMPLE COLLECTION**
12 samples • 4 predominant varieties
- FUEL CHARACTERISATION**
Proximate & ultimate analysis
- HOUSEHOLD-DEMAND MODEL**
Estimated annual household electricity demand



Fig.2 Cocoa pod husks left to rot on farms (field observation)



Fig.3 Farmer engagement in Edwenase (field data collection)

KEY FINDINGS

56 T / year
recoverable husks

18.28 MJ / kg
calorific value

80,772 kWh / year
electricity potential

Gasification was identified as the most feasible conversion option.

Graph 1 Annual electricity: potential vs estimated demand

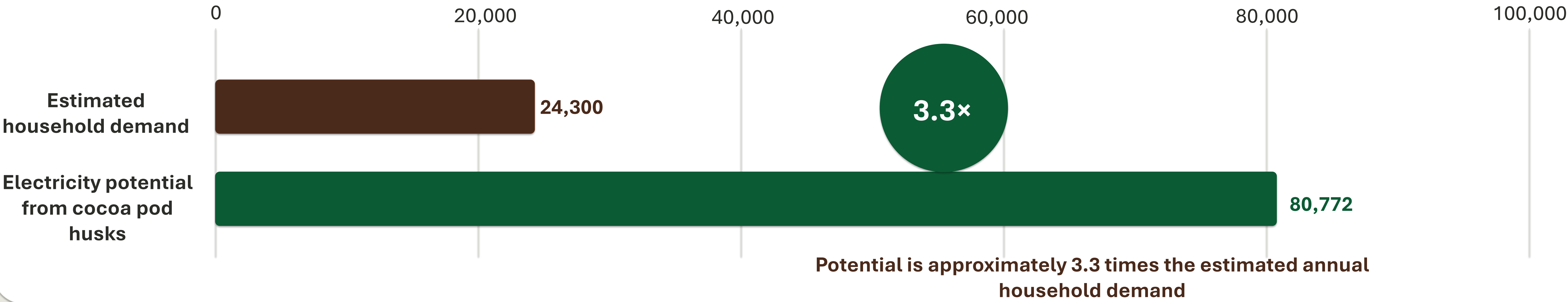


Table 1 Annual cocoa production in Edwenase (2019–2024)

Season	Production (Bags)	Number of cocoa pod husks (CPH)	Production (Tons)
2019–2020	1,500	2,250,000	96.0
2020–2021	1,350	2,025,000	86.4
2021–2022	1,200	1,800,000	76.8
2022–2023	1,000	1,500,000	64.0
2023–2024	900	1,350,000	57.6

Table 2 Ultimate analysis and resulting high heating value

Sample	H (%)	S (%)	N (%)	O (%)	C (%)	HHV (MJ/kg)
1	4.18	0.26	1.23	43.93	50.40	17.99
2	4.18	0.19	1.25	43.50	50.88	18.19
3	4.51	0.19	1.30	43.00	51.00	18.67
Mean	4.29	0.21	1.26	43.48	50.76	18.28

CONCLUSION

- Cocoa pod husks represent a valuable local biomass resource rather than an unmanaged agricultural residue.
- Before scale-up: test supply reliability, genotype effects, economic viability, environmental impacts, and market feasibility.
- Calorific value, 18.28 MJ/ kg, is comparable with common biomass fuels.
- Low nitrogen and sulfur content supports cleaner energy use.
- Future studies should aim to link circular bioeconomy development, rural enterprise, energy security, and inclusive livelihood diversification.

THOUGHT BUBBLE 2

Ever heard of Heritage Cocoa Farmers?

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