“Energy Efficiency Centre Georgia”

„Piloting Agricultural Waste to Meet Energy Demand in Georgian Covenant Signatories“

“Strengthening national capacity in applying sustainable energy policies and practices based on the recommendations of the Environmental Performance Reviews”

UNECE

30 June, 2021

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Traditionally Georgians are practicing in gardening, growing field crops and etc;

About 2.6 million hectares is agricultural land, including 468 thousands ha of arable land, 115 thousands ha of land with perennial crops and 1940 thousand ha of permanent meadows and pastures. Agricultural sector of Georgia plays an important role in the state's economy, contributing 7% of GDP while wood sector contributes 0.5% of GDP.

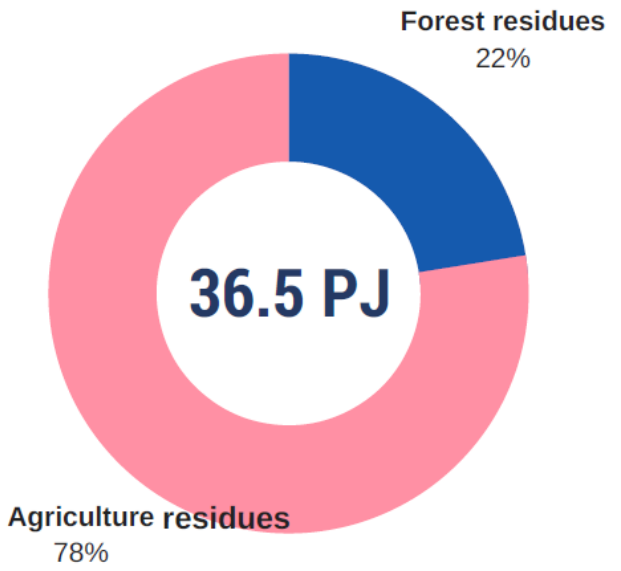
Forestry is considered as one of the most valuable natural resources and occupies about 40% of the country's territory. The wood resources is used mostly for heating or cooking.

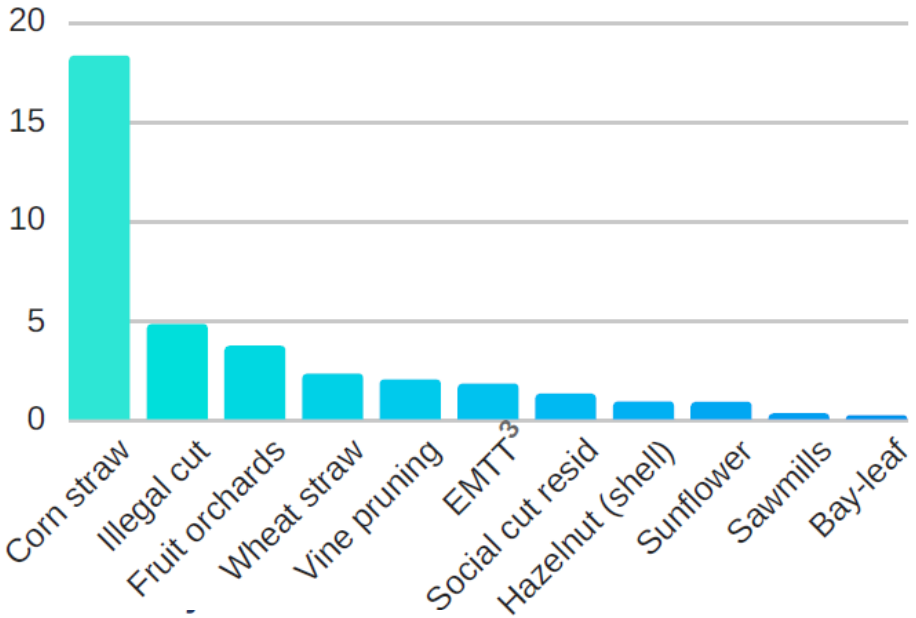
ENERGY EFFICIENCY CENTRE GEORGIA

AGGREGATED ENERGY BALANCE OF GEORGIA, 2019
(TJ)

	Coal	Crude Oil	Oil products	Natural Gas	Nuclear	Hydro	Geothermal, solar, wind, etc.	Biofuel & Waste	El	Heat	Total
Production	260,1	1 490,5	-	346,7	-	32 154,1	1 194,7	10 284,4	-	-	45 730,5
Imports	10 648,9	385,9	60 674,2	96 676,9	-	-	-	-	6 345,7	-	174 731,6
Exports	11,5	-	934,1	-	-	-	-	4,7	1 366,6	-	2 316,8
Int Marine Bunkers	-	-	89,5	-	-	-	-	-	-	-	89,5
Int Aviation Bunkers	-	-	4 346,1	-	-	-	-	-	-	-	4 346,1
Stock Changes	-787,4	-278,6	939,7	-	-	-	-	-	-	-	-126,4
DOMESTIC SUPPLY	10 110,1	1 597,7	56 244,2	97 023,6	-	32 154,1	1 194,7	10 279,7	4 979,2	-	213 583,4
FINAL CONSUMPTION	10 103,9	-	57 747,6	69 904,6	-	-	809,6	10 279,7	43 413,6	-	192 259,0
Industry	10 089,8	-	4 332,1	4 493,3	-	-	-	46,1	11 710,2	-	30 671,6
Transport	-	-	45 211,3	12 055,6	-	-	-	9,9	1 508,0	-	58 784,9
Other	14,1	-	959,2	43 212,1	-	-	809,6	10 223,7	30 195,4	-	85 414,0
Commercial and public services	0,3	-	43,3	8 125,4	-	-	498,1	126,4	13 628,9	-	22 422,3
Residential	9,5	-	441,6	**34 778,9**	-	-	268,9	**10 097,3**	8 859,6	-	54 455,8
Agriculture/forestry/fishing	4,4	-	474,3	**307,8**	-	-	42,6	0,0	291,2	-	1 120,4
Not elsewhere specified (Other)	-	-	-	-	-	-	-	-	7 415,6	-	7 415,6
Non-energy use	-	-	7 244,9	10 143,6	-	-	-	-	-	-	17 388,5

Biomass energy potential:





Fruit orchard, wheat, vine pruning and hazelnut together account for **24% of the total biomass energy potential**

In Georgia is generated about 304Kt of agricultural residues with 5000TJ (1.565TWh) annual of energy resource from perennial crops production.

Main resources for perennial crop residues are:

- Vineyard's pruning residue – 108kt with 2.0 PJ - 0.556 TWh;
- Fruit orchards' pruning residue - 81kt with 1.5 PJ -0.417 TWh;
- Nut shells and cuttings – 68kt with 1.3 PJ -0.361 TWh
- Bay leaf cuttings - 9kt with 0.2 PJ -0.056 TWh;



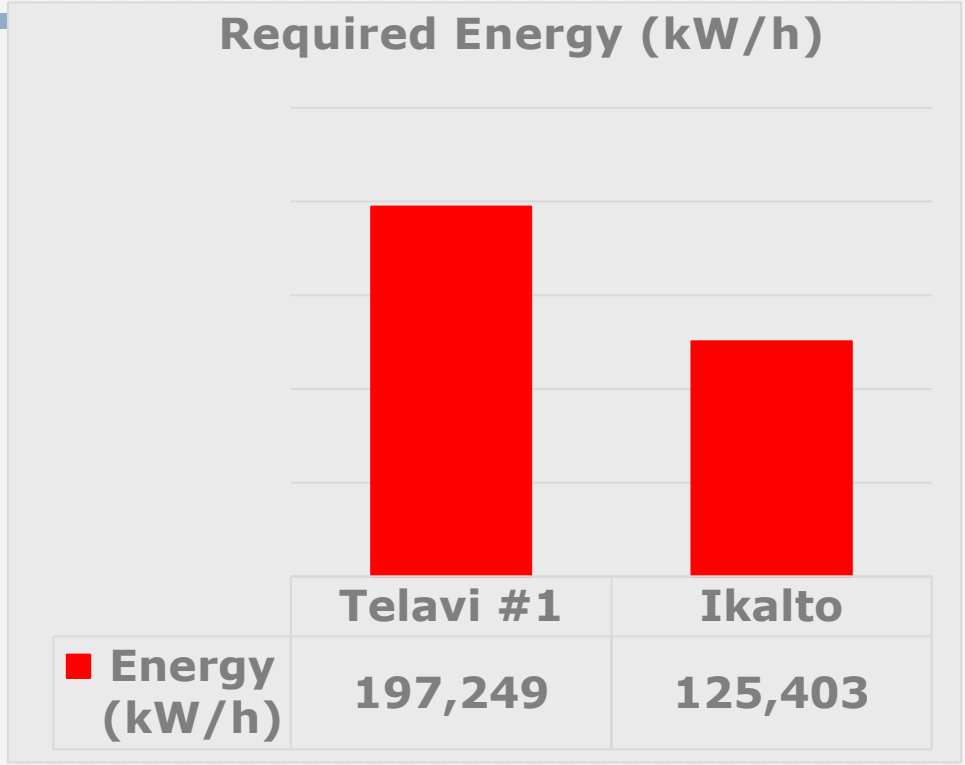

Pilot Kindergartens

	Telavi # 1	Ikalto
Heated Area (m2)	1,510	960
Ownership	Telavi municipality	Telavi Municipality
Number of beneficiaries (person)	167	98
Number of Floors	2	2
Type of used fuel (for heating)	Natural gas	Firewood
Type of used fuel (hot water & cooking)	Natural gas	El. LPG
Amount of fuel use for the period 2015-2017 (m^3)	60,580	40
The total cost of fuel for the period 2015-2017 (GEL)	66,032	3,840
Annual cost of fuel for the period 2015-2017 (GEL)	20,010	1,280

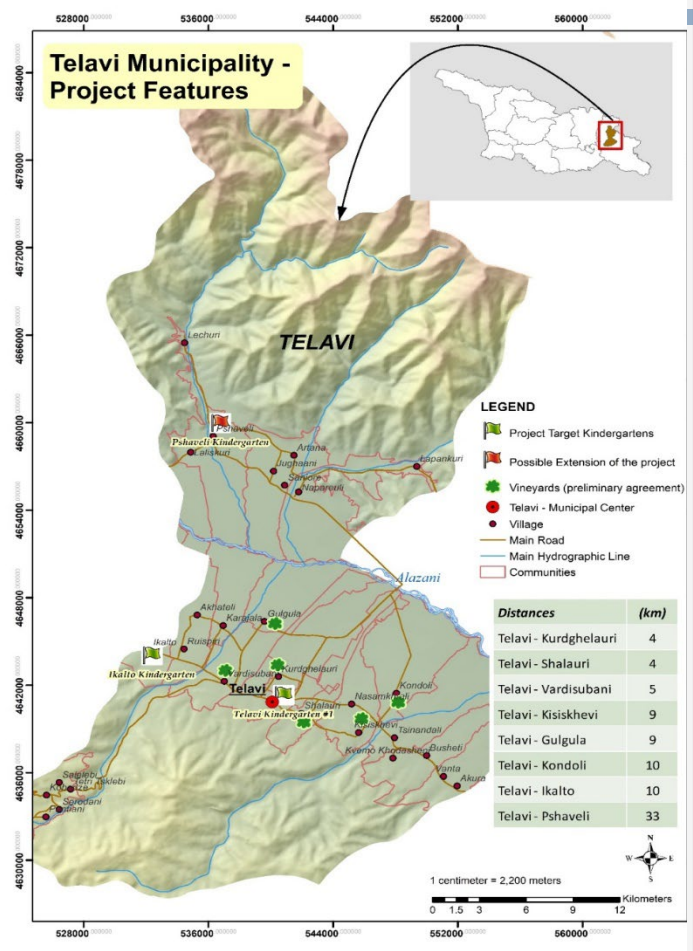
Required energy

Assumptions:

- Working duration of the system is 8 hours
- 20 working days in each month
- The heating season lasts about 6 months (120 days)

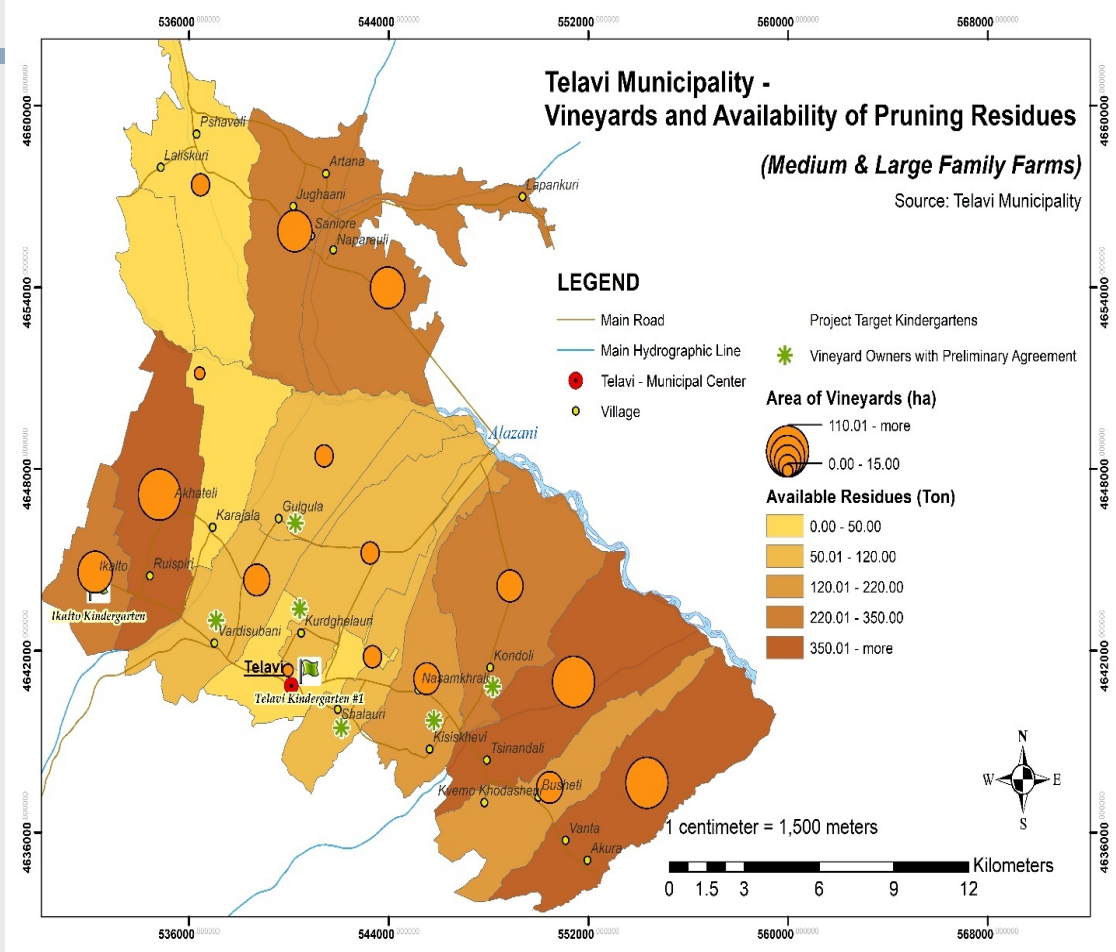


Main components of the Project BioMass Utilization for Com Municipality Telavi



- Vineyards and vineyards pruning residues (as the main basis of biomass fuel)
- Two kindergartens in Telavi municipality - main beneficiaries
- Auxiliary facilities – equipment, warehouse (store and drying of biomass)
- Communication means (roads)

Local biomass potential



The volume of biomass throughout the whole Telavi municipality can be assessed as a **17,400 tons**

The volume of biomass, from medium and large family farms (1 ha and more) - **3,500 tons**

Required amount of prunnings

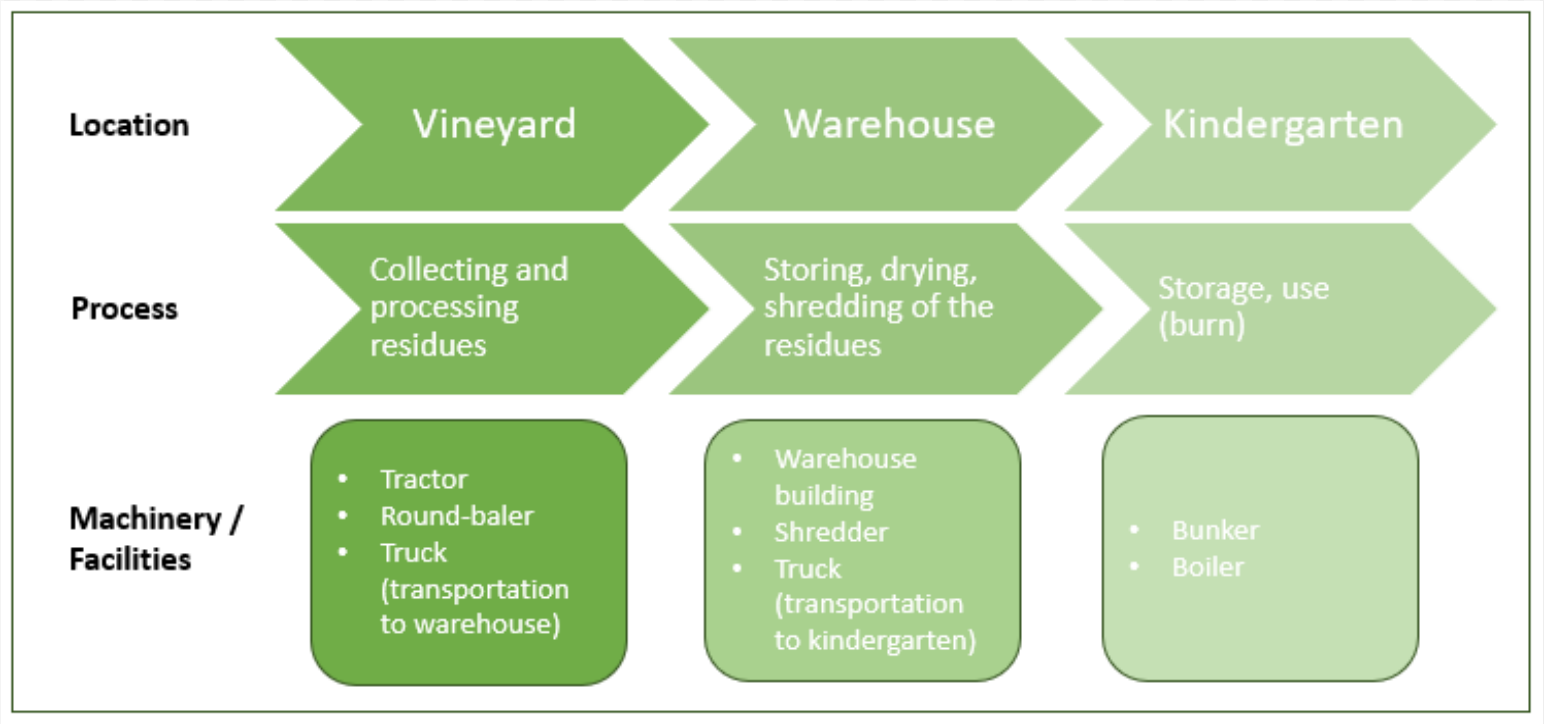
	Telavi # 1	Ikalto
Required energy per season, kWh	197,249	125,403
Caloric value vineyard residues, kWh/kg	5.1	5.1
Required vineyard residues per season, kg (dry)	38,676.27	24,588.82
Required vineyard residues per season, ton (wet)	approx. 65*	approx. 41
Number of hectares to collect needed amount of residues, ha.	22.5	14.5

The moisture content of vine pruning right after harvesting is about 50%. After drying moisture content falls to 7-10% after 23-30 week.

The European Union for Georgia
EU4Energy

Covenant of Mayors for Climate & Energy
Demonstration Projects
Eastern Partnership

Process of vineyard pruning residues supply chain



Biomass Supply Chan

Manual pruning	Collection with baler	Bale transport to intermediate storage	Chipping (above) or pelleting (below) of pruning bales	Transport to final destination	Self-consumption

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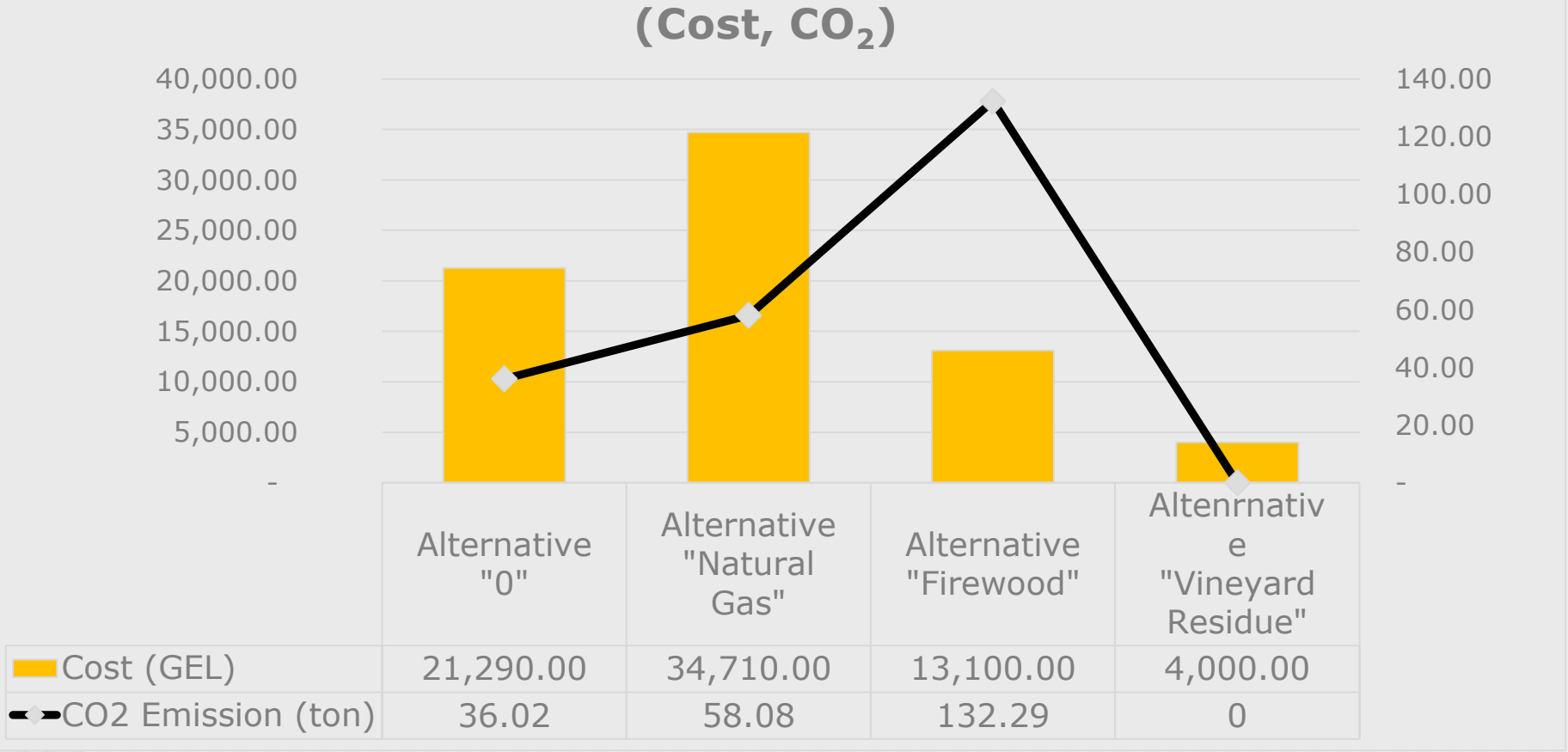
Comparison of different alternatives



Alternative	Required energy, kWh	Required amount of fuel	Total price of required fuel, GEL	Price per 1 kWh, GEL
"Natural Gas"	205,086	22,052 (m^3)	24,037	0.1172
"Firewood"	205,086	101 (m^3)	9,650	0.0471
"Vineyard Residue"	205,086	250 (m^3)	15,500	0.0756

Thanks for your attention!

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