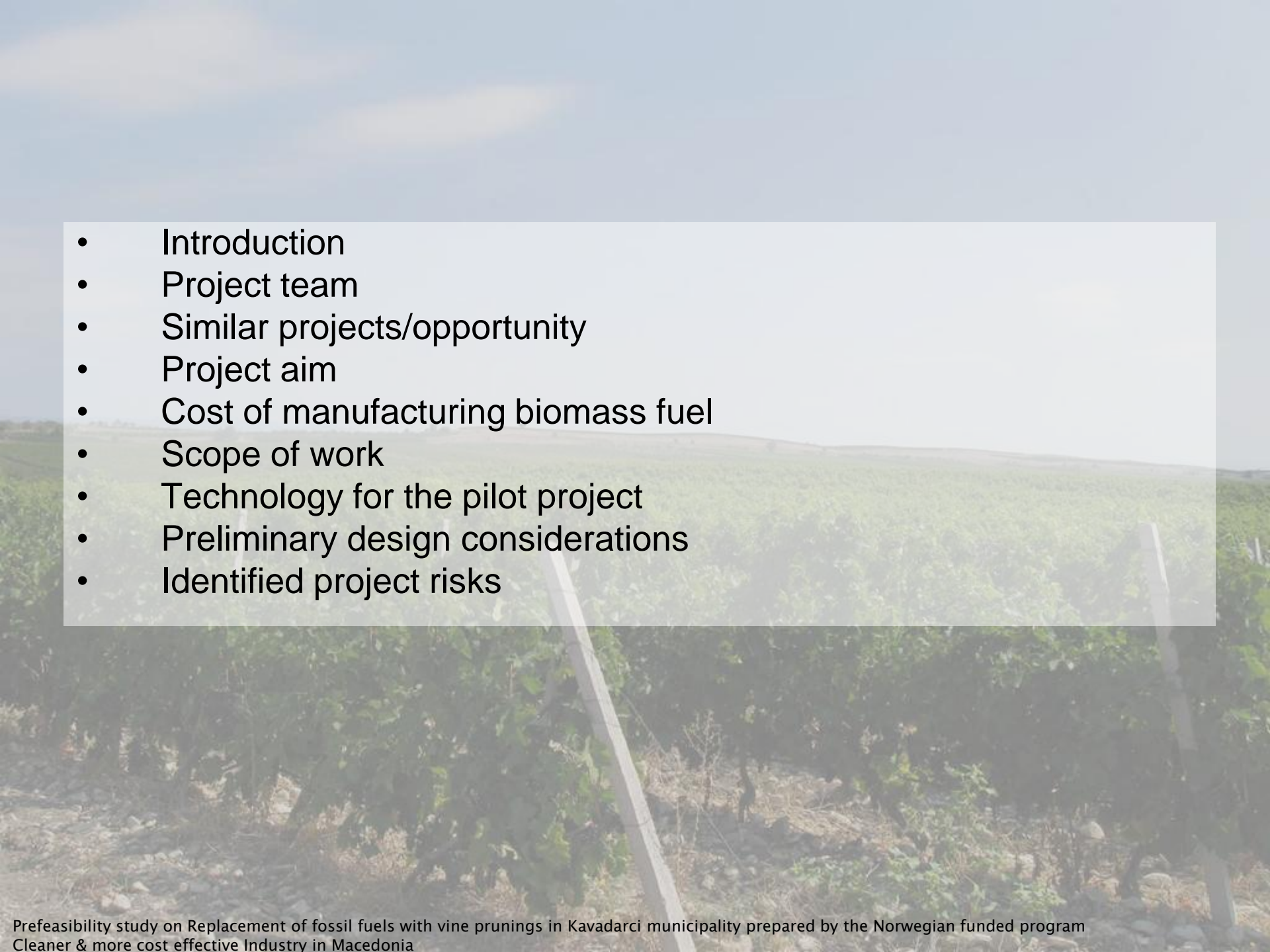


Replacement of fossil fuels with vine prunings in Kavadarci municipality **Pilot project “Dobri Daskalov” high school**

Prefeasibility study on Replacement of fossil fuels with vine prunings in Kavadarci municipality prepared by the Norwegian funded program Cleaner & more cost effective Industry in Macedonia



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- Introduction
 - Project team
 - Similar projects/opportunity
 - Project aim
 - Cost of manufacturing biomass fuel
 - Scope of work
 - Technology for the pilot project
 - Preliminary design considerations
 - Identified project risks

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• Introduction

- The largest municipality in Macedonia with vineyards is Kavadarci
- In Kavadarci region availability of vine residuals are around 20,000 ton/year
- One hectare can provide 1,5-2 tons of vine branches
- Vine branches average characteristic's:
 - heating value 4 MWh/ton with humidity of 25%
 - 200-300 kg/m³ density

- **Scope of work**
 - Switch from oil to biomass fuel in 1 secondary school
 - Remove old boiler
 - Reconstruction of boiler room
 - Install new biomass boiler with feeding system
 - Possible (replacement of windows and roof as a part of joint EE project)
 - Organise production, storage and distribution of biomass (chopped vine branches)
 - Capacity building of local government and grape producers
 - Obtain establish system for production of biomass fuel

- **Project Aim**
 - Assessment of use of vine prunings as fuel for heating purposes in Kavadarci municipality
 - **Environmental benefit**
 - Compliance with environmental legislation
 - Reduction of GHG emissions
 - **Economic development**
 - Additional income for grape producers
 - Implementation of new technology
 - Reduced heating costs

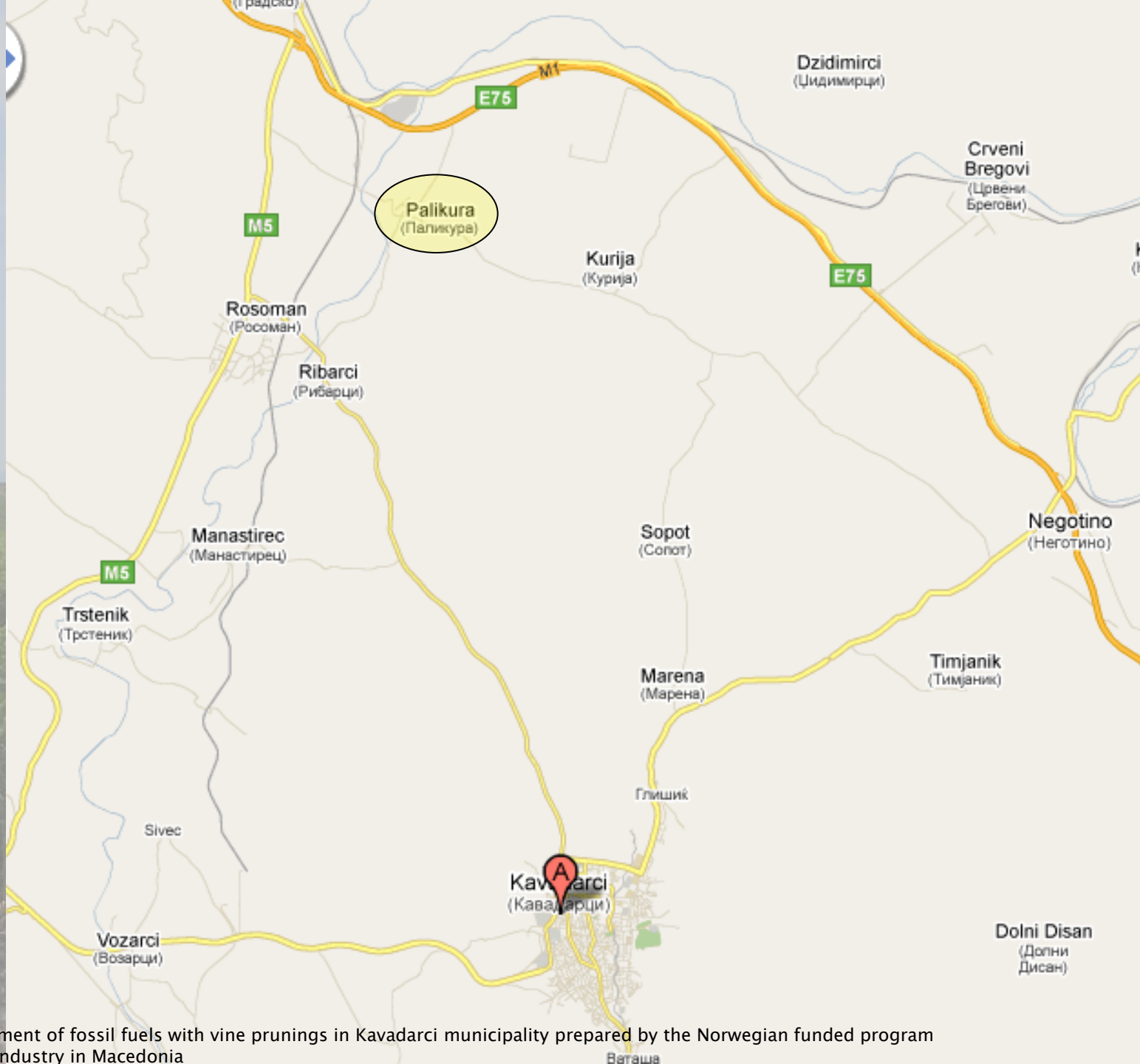
- **Similar projects/opportunity**
 - In Portugal and Italy there are similar projects using biomass residue for heating
 - Bulgaria there is a project where bio fuel is the wood waste from the wood factory In
 - Macedonia it will be first project that will use residuals from vine as fuel for heating in the public school
 - With the feasibility study that Norsk Energi have done in the public buildings in Kavadarci gave the opportunity with this initiative

The location of the vineyards

•With consultation from the municipality this location was selected because homogeneity of the vineyards and storage of the bio-fuel

•17 hectares owned by Kozuvcanka, located in the v. Palikura 11km from Kavadarci

•Mechanization: Tractor IMT 539, trailers 3 and 5 tons



Chipping of trenches.

The machine for chipping is tractor mounted and it can be easily moved. For this operation there is need of two workers. They will operate and load the machine with trenches. The chops from the machine are poured directly in to the tractor trailer. They are all tractor powered and mounted so easily the wood chipper can be moved from place to place. The capacity of these machines is from 1 to 4 tons per hour.



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- Possible location of the storage place for the residuals 150m²
- Vineyards owned by A.D. Kozuvcanka



Cost of manufacturing biomass fuel

1ha can give 1,5 t. residuals at a cost of app 100 euro/ton
 1,5 ton residuals can replace 0,5 ton oil
 0,5 ton oil cost app 500 euro

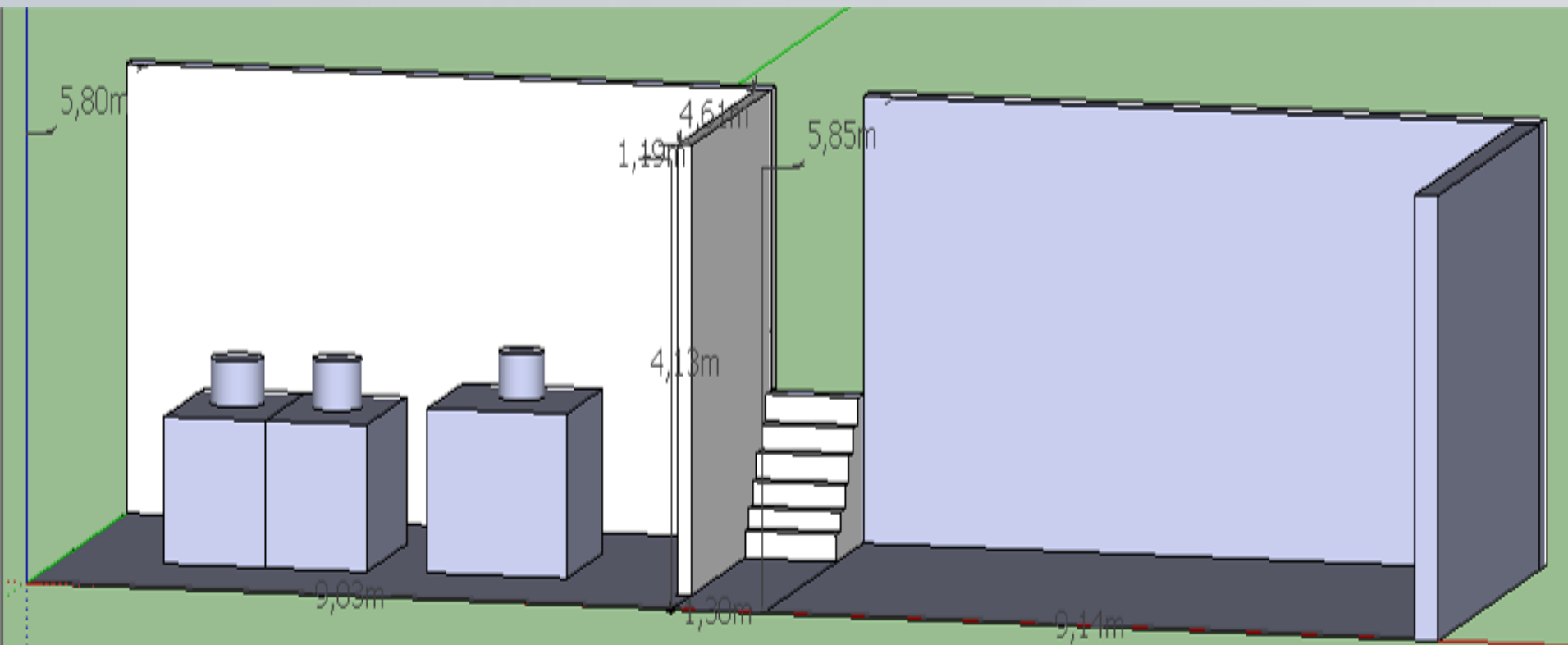
Potential Production in Palikura

Vineyards hectares	35	Residuals ton.	52,5	Residuals vol. (m3)	173,25	Replace Oil (t)	17,5
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Labor	hours	euro/h	total	Fuel (lit)	euro/lit	total
Chopping	140	2,5	350	350	0,8	280
Transport	50	2,5	125	80	0,8	64
Unloading	40	2,5	100			
Drying	50	2,5	125			
Total			700			344

The public secondary school “Dobri Daskalov “has one boiler on wood with capacity of 300KW and other 2 light oil boiler of 225KW. The plan is change the wood boiler with new biomass boiler with same capacity of 300KW

The room of about 50m² and 4 meters height that can be used for storage of the residuals





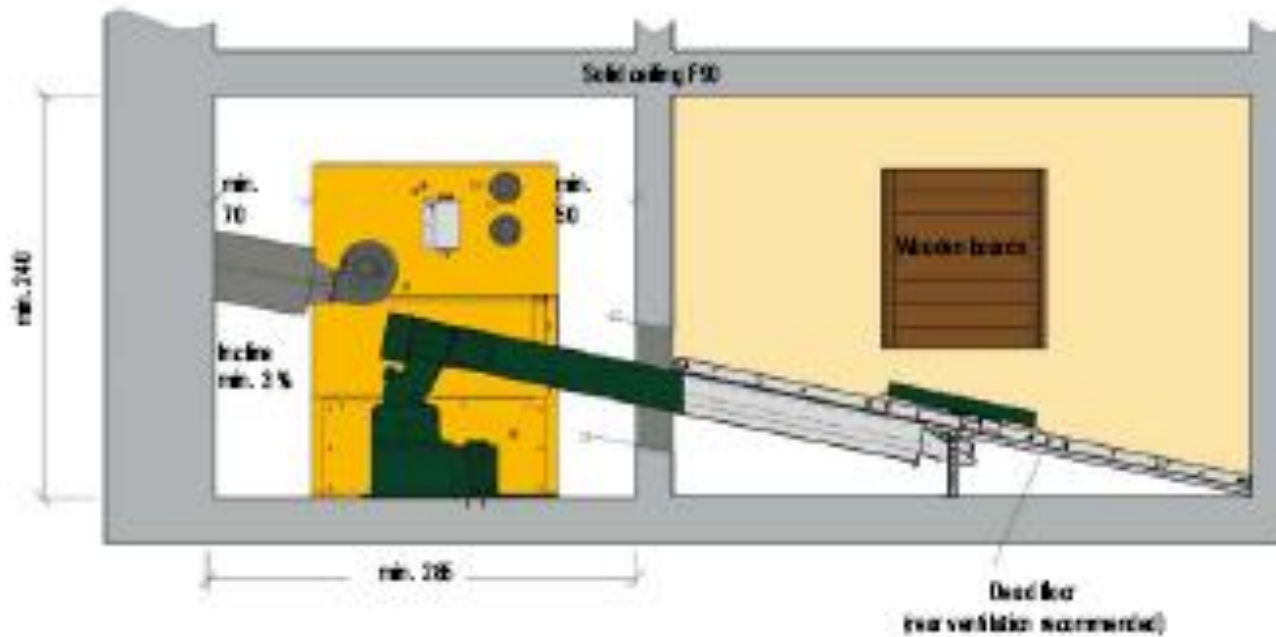
The wood boiler
300KW from the
year 1959



Storage
room 50m²

Design of the facility

Outline



Project costs: App 95 000 euro

Direct investment costs Purchase and installation of equipment, labor etc	67,000 euro
Education of wine growers and local government:	11,400 euro
Consultation services	10,000 euro
In house contribution for management of the project Kavadarci municipality	6,000 euro

Proposed project funding

Institution	What	Investment cost
World Bank-GEF	50% grant for energy efficiently projects	33,000-47,000
GEF-Small grants program	For supply and operation of chopping machine, and awareness raising and training of farmers	5,000
Norwegian Ministry of Foreign Affairs	Grant for technical assistance and project development	10,000
Municipality of Kavadarci	Investment and installation of bio-boiler and project management	10,000
Loan financing?	Investment in boiler	23,000-37,000

Pay back time 6-7 years

Calculation D (in euros)							
Year	1	2	3	4	5	6	7
Income (Oil cost)	13.659	13.659	13.659	13.659	13.659	13.659	13.659
Expenses	66.534	3.694	3.694	3.694	3.994	3.694	3.694
Revenue	-52.875	-42.911	-32.946	-22.982	-13.317	-3.353	6.612
Expenses							
Wood chipper	3.100	50	50	50	50	50	50
Bio Boiler	57.790	1.000	1.000	1.000	1.000	1.000	1.000
Reconstruction	3.000	0	0	0	300	0	0
Labor	700	700	700	700	700	700	700
Fuel (tractor)	344	344	344	344	344	344	344
Rent (storage)	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Transport (truck)	600	600	600	600	600	600	600

Identified project risks

- Cost of fuel for high schools are funded by Ministry of Education – No incentive for the schools to save energy?
- Price of biomass supplied to end user
 - Agreement to be made to both allow reduction in fuel cost for user, and a margin for manufacturing the biomass fuel, due to lack of competitive market
- Obtaining of additional funds for pilot project implementation and market development
 - Which bank provides loan this type of projects?
 - Which Ministries can support this type of projects?
 - Ministry of Education
 - Ministry of Economy
 - Ministry of Environment and Physical Planning

Conclusion

- There is a potential to go from usage in vine pruning in pilot project to wider use in other facilities in the region
- Government should consider providing incentives for municipal energy efficiency and renewable energy projects, and this way stimulate market development
- The sector has business opportunities!

Thank you for your attention!

