



*Greening Energy
Market and Finance*

Project website: <http://grenfin.eu>

Case Study on Renewable Energy Communities

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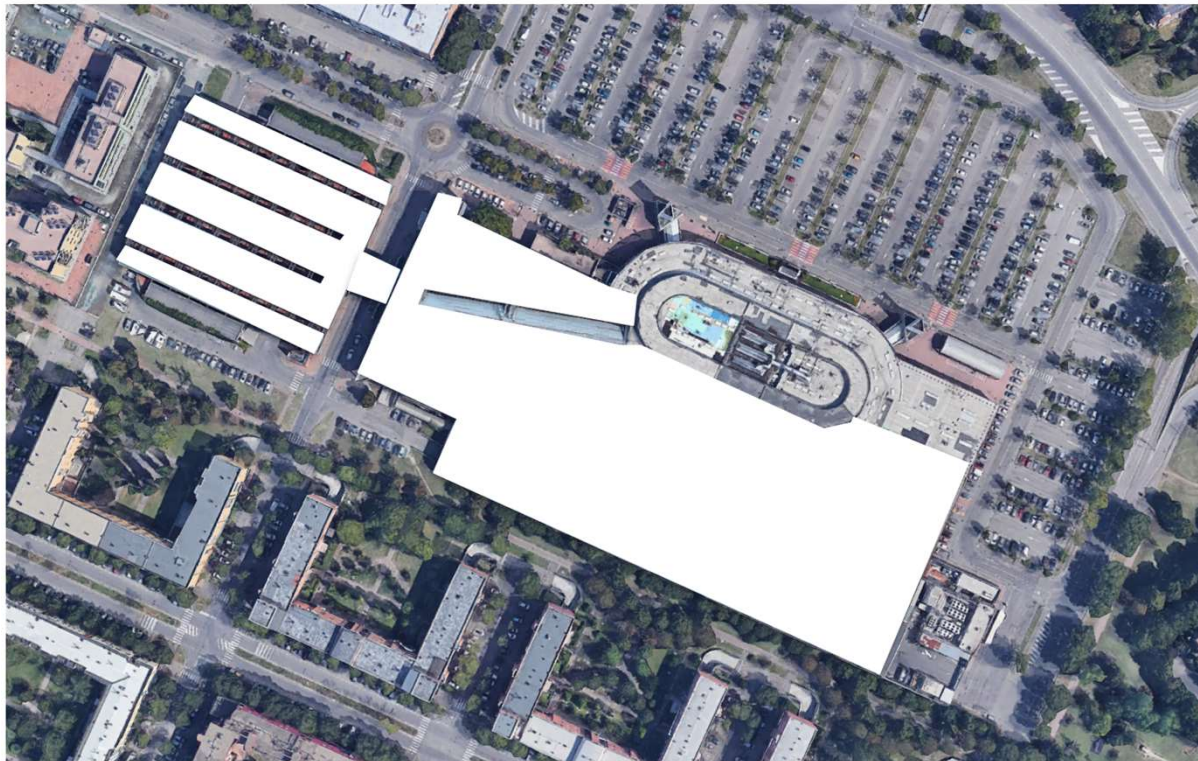
Renewable Energy Communities

- Simplified renewable energy communities based on **solar photovoltaic** project.
- Italy, Modena, “La Rotonda” **shopping center**





1. REC Implementation Design



- **Area:** 23.000 m²
- **Azimuth:** -65
- **Slope:** 20°
- Estimates of power plants: 1.5kW per 10 m² ≈ **3450 kW**





2. Production

- The plant has an **annual production** capacity of **4,077 MWh** with an estimated annual production **loss** in power of about **0.7%**.
- Production estimates were generated using the PV performance tool **PVGIS¹**.
- The projects **initial fixed costs** included:
 - PV plant installation: EUR650 / kW
 - Fee to Grid Manager: EUR40/MWh
 - Fee to System Manager: 24,000/Yr
 - Fee to System O&M&I: 24,000/Yr

¹https://re.jrc.ec.europa.eu/pvg_tools/en/#PVP





3. Selling electricity: market segmentation

ELECTRICITY USERS

1 Prosumer: a mall (pays 140EUR for a MWh)

- receives 80% of power generation

22 Small Consumers (pay 100EUR for a MWh)

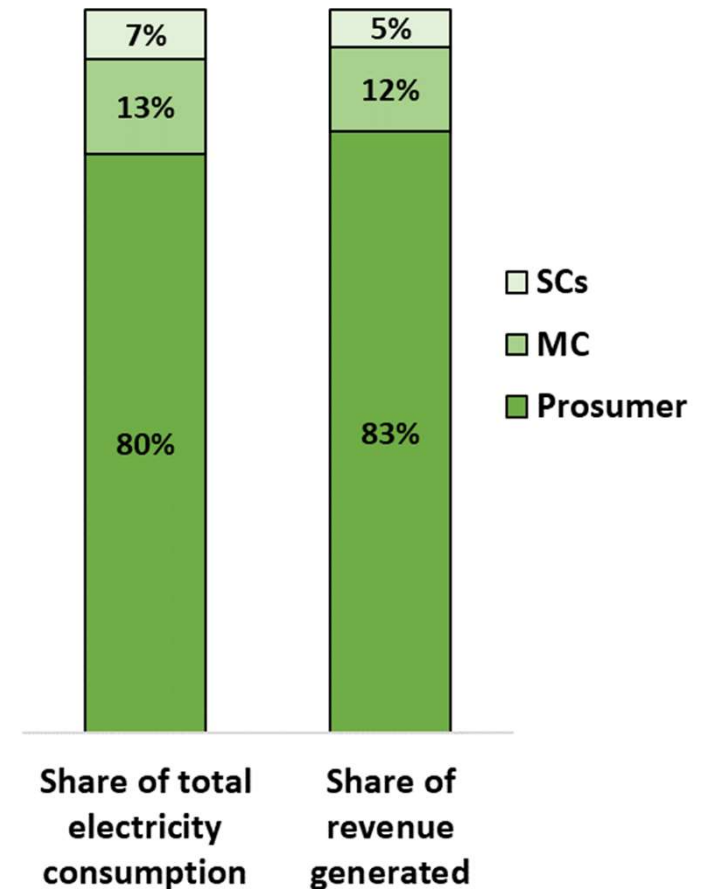
- each consumes 3 to 15 MWh/year, whilst PVs provide them with 10 to 14 MWh/year over the 20 years
- no commitment to serve demand fully as SCs benefit from a very appealing price discount (50% compared to market price)

1 Medium Consumer: a shop (pays 120EUR for a MWh)

- typically consumes 100 to 1500 MWh/year
- the PV installation commits to providing 500 MWh/year

APPEALING TO SMALL CONSUMERS

- SCs are the most important actors: they influence and vote
- The priority is to offer them cheaper electricity
- The Prosumer and MC subsidize SCs' access to power





4. Results: Business plan

Business plan:

	Production, MWh:	Costs:					Consumption, MWh:			Revenues:			Net cash flows:		
		Variable cost	Fixed costs		Average MWh cost	Prosumer	Medium	Small	Prosumer	Medium	Small	FV	PV (year 0)	Accumulated PV	
Year 0		-€2.242.500,00										-€2.242.500,00	-€2.242.500,00	-€2.242.500,00	
Year 1	4077	-€32.619,40	-€24.000,00	-€24.000,00	€51,77	3262	500	315	€456.671,55	€60.000,00	€31.548,49	€467.600,65	€449.616,01	-€1.792.883,99	
Year 2	4049	-€32.391,06	-€24.000,00	-€24.000,00	€51,86	3239	500	310	€453.474,85	€60.000,00	€30.977,65	€464.061,44	€429.050,89	-€1.363.833,10	
Year 3	4021	-€32.164,32	-€24.000,00	-€24.000,00	€51,94	3216	500	304	€450.300,53	€60.000,00	€30.410,81	€460.547,01	€409.424,62	-€954.408,48	
Year 4	3992	-€31.939,17	-€24.000,00	-€24.000,00	€52,02	3194	500	298	€447.148,42	€60.000,00	€29.847,93	€457.057,18	€390.694,40	-€563.714,09	
Year 5	3964	-€31.715,60	-€24.000,00	-€24.000,00	€52,11	3172	500	293	€444.018,39	€60.000,00	€29.289,00	€453.591,78	€372.819,38	-€190.894,70	
Year 6	3937	-€31.493,59	-€24.000,00	-€24.000,00	€52,19	3149	500	287	€440.910,26	€60.000,00	€28.733,97	€450.150,64	€355.760,59	€164.865,89	
Year 7	3909	-€31.273,13	-€24.000,00	-€24.000,00	€52,28	3127	500	282	€437.823,88	€60.000,00	€28.182,84	€446.733,59	€339.480,81	€504.346,70	
Year 8	3882	-€31.054,22	-€24.000,00	-€24.000,00	€52,37	3105	500	276	€434.759,12	€60.000,00	€27.635,56	€443.340,45	€323.944,53	€828.291,22	
Year 9	3855	-€30.836,84	-€24.000,00	-€24.000,00	€52,45	3084	500	271	€431.715,80	€60.000,00	€27.092,11	€439.971,07	€309.117,84	€1.137.409,06	
Year 10	3828	-€30.620,99	-€24.000,00	-€24.000,00	€52,54	3062	500	266	€428.693,79	€60.000,00	€26.552,46	€436.625,27	€294.968,39	€1.432.377,45	
Year 11	3801	-€30.406,64	-€24.000,00	-€24.000,00	€52,63	3041	500	260	€425.692,94	€60.000,00	€26.016,60	€433.302,89	€281.465,30	€1.713.842,75	

Summary:	
Required rate of return	4%
Average MWh cost	€52,59
IRR	19,59%
NPV 10y	€1.432.377,45
NPV 20y	€3.732.458,48



5. Conclusions and project outcomes

- The 20 years **NPV** of the project is **3,73 mln €** with initial investment 2,24 mln €.
- **IRR** is **19,59%** which is quite attractive.
- The discounted payback period is 6,54 years.
- The price for electricity is **significantly reduced** for clients (100€ discount for small customers and 10€ discount for others).
- **Social outcomes:** 1 or 2 new jobs are going to be created per PV plant.
- **Environmental outcomes:** GHG emission is going to be reduced by 5500 tCO₂ equivalent, air pollution is going to be reduced.





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Thanks for the attention



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