

CASE STUDY ITALY

3.3

3.3.1 Description of Treatment Plant

The Italian feasibility study was realized by the multi-utility Montefeltro Servizi S.p.A. servicing the area of High Valmarecchia

(Figure 3.1), located between the regions of Tuscany and Marche, the Republic of San Marino and Emilia-Romagna, to which it belongs. The area has a low population density and includes seven municipalities.

Figure 3.1

The area of High Valmarecchia



Montefeltro Servizi provides environmental services for all the seven municipalities with a total population of about 17,000 inhabitants. At present, the company only manages the waste produced in the area and sorts and delivers it to specialised centres for the final disposal, whereas due to a recent change in the regional reorganisation of waste and wastewater management, the company is no longer involved in wastewater treatment.

The collected waste contains a large proportion of dry organic waste that cannot be used for anaerobic digestion and must be stabilized in the composting process. Composting is a well-known and energy-intensive process that in the specific case of Montefeltro Servizi is conducted in another plant several kilometres away from the collection point.

Table 3.4
Present annual waste collection

Type of waste	Tons per year
Undifferentiated municipal waste	5,100.00
Differentiated organic fraction	405.98
Prunings	261.51
Exhaust vegetal oil	1.58

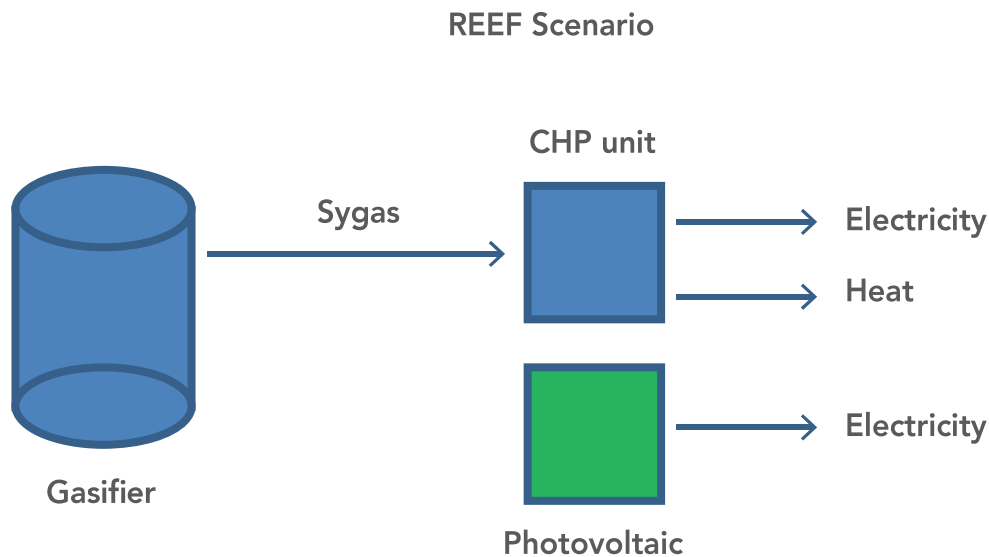
3.3.2 Selected scenarios by REEF 2W decision support tool

Presently, there is no energy production at the treatment plants, against a total electricity consumption of about 17,247 kWhel./year and a total thermal energy consumption of about 22,400 kWhth./year, produced by using about 2,100 cubic meters of methane. The feasibility study realized showed that a marked improvement of the situation could be reached through the optimization

of the collected biomass and its gasification, coupled with a photovoltaic plant. In fact, the most favourable scenario optimizes the quantity of biomass available for the gasification process integrating all the biomass available: the organic fraction of municipal waste, prunings deriving from the maintenance of public green and from mowing of brushwood along the banks of rivers, exhaust mushroom litter coming from an enterprise of the territory, the excess sludge of three small WWTPs.

Figure 3.2

The technological scheme of the status planned plants



3.3.3 Results and Discussion

Energetic point of view

The expected situation after the pilot implementation is completely different than the status quo: in the REEF 2W scenario, the production of about 1,070 MWhel. will allow Montefeltro Servizi to become from consumer to net producer of energy. In particular, the production of 19.52 MWh of electricity from photovoltaics will cover practically all its electricity needs, allowing to use the additional production of 1,050 MWhel. from bio-gas for other needs, whereas the production of about 1,200 MWh of thermal energy will cover all the plant needs in the absence of external users.

Economic point of view

From an economic point of view, the possibility to use on site the produced energy and the presence of incentive measures are

key factors. In our case, the situation is even more favourable thanks to a specific measure provided by the Italian legislation called "scambio sul posto altrove" (exchange on the site elsewhere). Based on this regulation, public bodies can produce electricity in any place of the Italian territory and use it in any other place where the same public bodies have a utilization point. In our case, the place where the electricity will be produced, that is the Montefeltro Servizi treatment platform, is directly owned by the seven municipalities and the excess of electricity produced can be used by the same municipalities for all their electricity needs (public lighting, provide energy at schools, social centres, etc.). Under this conditions, the pilot plant can generate consistent savings for the cost of electricity for the seven municipalities of about Euro 189,000 per year, allowing an investment return time of 5 years.

Ecological point of view

The environmental assessment of the considered solutions shows a strong advantage in terms of reduction of carbon emissions. In the assessment, only the electric energy produced and eventually introduced in the grid has been considered. The reason for this choice is directly related to the spatial assessment done that reports a strong disadvantage for the use of heat. Consequently, considering only this aspect, more than 19,000 tons of CO₂eq. could be removed, if the gasification of the biomasses can be applied.

3.3.4 Conclusion

The feasibility study for the pilot case of Montefeltro Servizi in Emilia-Romagna region showed that the implementation of a gasification plant, allowing the production of both electricity and heat using all available biomass, coupled with photovoltaic panels, could be highly beneficial even in case of very small multi-utilities serving dispersed communities. Table 3.5 shows how the REEF 2W implementation can improve the present situation (status quo) not only for a best composite index, but also under all the single aspects: environmental, social, economic, technical.

Table 3.5
The result of multi-criteria decision analysis

Criterion	Composite Index (Status quo)	Composite Index REEF 2W technology
Environmental	21	29
Social	9	21
Economic	5	9
Technical	15	29