



LET'S RECYCLE!



AN OVERVIEW OF THE DATA...

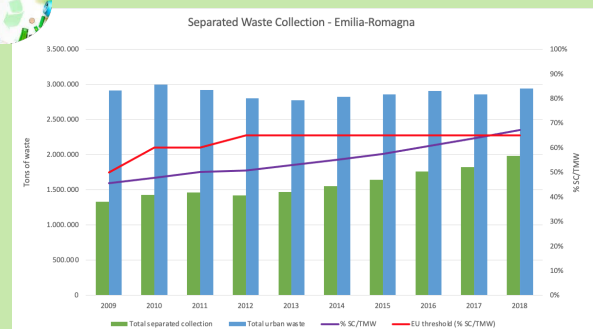
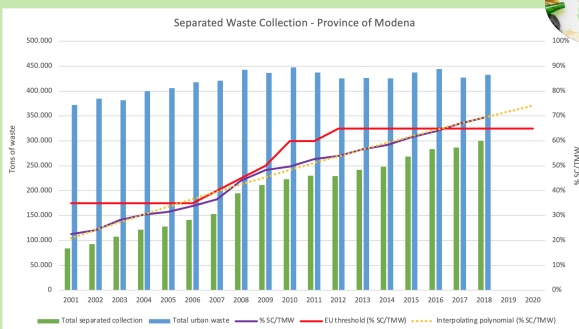
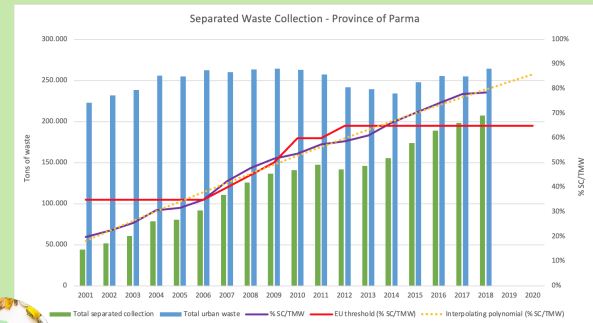
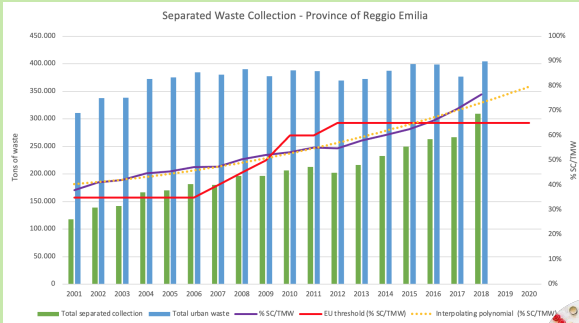


1 Separated waste collection in Reggio Emilia, Parma, Modena and Emilia-Romagna

Our analysis focuses on separated waste collection in the provinces of Reggio Emilia, Modena and Parma and aims at comparing the available data over the time span 2001-2018. Through a combined dual axis graph, we have shown the evolution of the following variables: separated collection (SC), total municipal waste (TMW) and their percentage ratio (SC/TMW), whose trend in the time span 2001-2018 has been interpolated as described below and extrapolated up to the year 2020. The SC/TMW ratio has then been compared to the EU threshold, which is the percentage of separated collection which EU states are required to reach over a given span of time. The evolution of the variables for each of the plotted provinces has also been compared to the overall available data of the Region, which unfortunately only refer to the time span 2009-2018. This is, however, sufficient to observe an increase in the percentage of separated waste collection over total municipal waste in the Region.

A linear regression with an exponential smoothing has been used to compute the two-year forecast ahead. To determine the suboptimal window of observation, in the calibration process we have tested rolling windows whose lengths range from 6 to 11 years, using Mean Absolute Error as a metric.

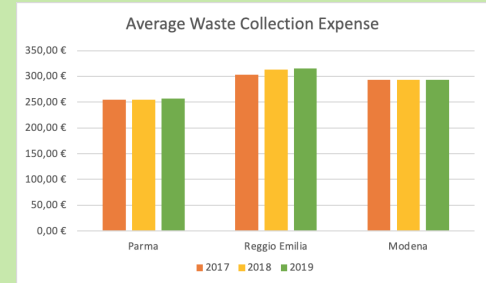
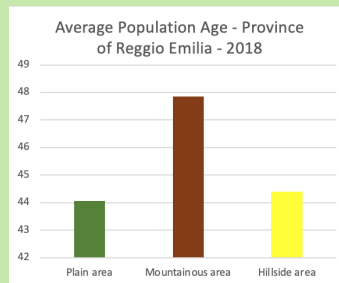
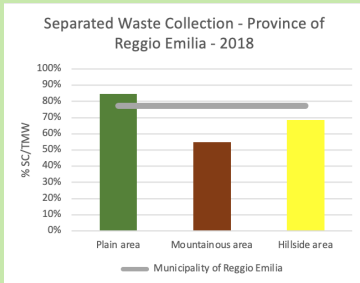
Eventually, we have selected rolling windows of 7 years for Reggio Emilia and Parma and of 9 years for Modena.



2 Provincial data and average waste collection expense

The province of Reggio Emilia has been divided into three macro-areas* based on territorial morphology. These macro-areas show relevant differences in the year 2018. The gap between the mountainous area and the other macro-areas may be due to a higher average population age.

The average yearly expense per family in the Reggio Emilia province is increasing steadily, but there doesn't seem to be a direct proportion between the expense and the SC/TMW percentage.



* The macro-areas have been classified according to geographical criteria. The mountainous area covers all the municipalities 800 meters above sea level. The hillside area refers to the territory between the south border of the municipality of Reggio Emilia and the mountainous area, whereas the plain area refers to the municipalities stretching north of the hillside area towards the northern border.

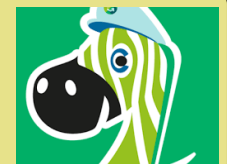
3 Conclusions and further developments

In the period 2001-2018 the percentage ratio of separated waste collection has significantly increased. In some cases, it has more than doubled, if not tripled.

The current system of waste disposal tax has the purpose of promoting awareness of the benefits of increased separated waste collection. In addition to fixed fees, there is an extra charge for any additional emptying of non-separated waste. In this way, those who are more accurate with separated waste collection will be charged less or only the minimum fee.

An app "to make it easier"!

Useful and modern apps can be used to understand how waste can be disposed of and recycled properly. For instance, Junker is an application, that we have personally tested, which, in a matter of seconds, states in which bin to put a certain product by simply scanning the product bar-code. This app is foolproof, and in case it can't give us precise instructions about a product disposal, it refers to municipal regulations and indications. It would be useful if waste collection companies would integrate services, such as Junker in their apps and websites, making people's lives easier consistently with territorial resources.



... AND TO CONCLUDE SOME THEORY AND REFERENCES

Trash is collected in two different types of containers, such as street huge bins with top openings or smaller bins in the door-to-door collection. These containers are emptied by local waste management companies by means of shredding trucks with on-board high-volume capacity shredders to compact garbage on the go. Upon reaching the treatment center, recyclable wastes are selected to undergo specific procedures which revert them to the original state. The materials so obtained can be used again in the productive process.

To avoid storage of non-recyclable waste in landfill, which can be very harmful to the environment, this garbage may be used to produce new energy through thermovalorization. By doing so, disposed materials can move on to a new life, thus reducing the use of new raw materials: this is the so-called circular economy!

All the data analysed in this work are from ISPRA's waste database, from Huffington Post, from "Memoria ISPRA" (downloaded from the Italian Chamber of Deputies), from ISTAT, from Ugeo Urbistat, from Parma's and Piacenza's newspapers and from Cittadinanzattiva.

