



**Municipality of**  
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# **Methodology of solid waste producers' identification in the context of the circular economy**

*Dr. Miltiadis Kavrakos*  
*Director of Waste Management and Recycling Unit*  
*Municipality of Vari – Voula – Vouliagmeni*

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**Thessaloniki, GREECE**



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## **The basic philosophy of solid waste producers' identification**

The basic philosophy of the methodology of solid waste producers' identification is to weight and identify the produced waste by citizens, businesses and organizations in the city of Vari – Voula – Vouliagmeni (VVV), in order to strengthen their participation in the Municipality's recycling activities by applying various specific incentives.

The increasing of the waste quantities that pre-selected - recycled - composting, will lead to a decrease of quantities of unprocessed waste, that are currently leaded to burial. There are obvious economic benefits, resulting from the saving/reduction of landfill taxes and fines

The new, innovative idea for Greece, which we have begun to implement in the VVV Municipality, concerns the development of a set of processes and tools that identify the waste producer, locally and in time. Thus the VVV Municipality will be able to apply the 'polluter pays' principle reliably and reward those citizens that sort waste at source, applying 'Benefit As you Save' procedures and supply the local circular economy with recycled materials.



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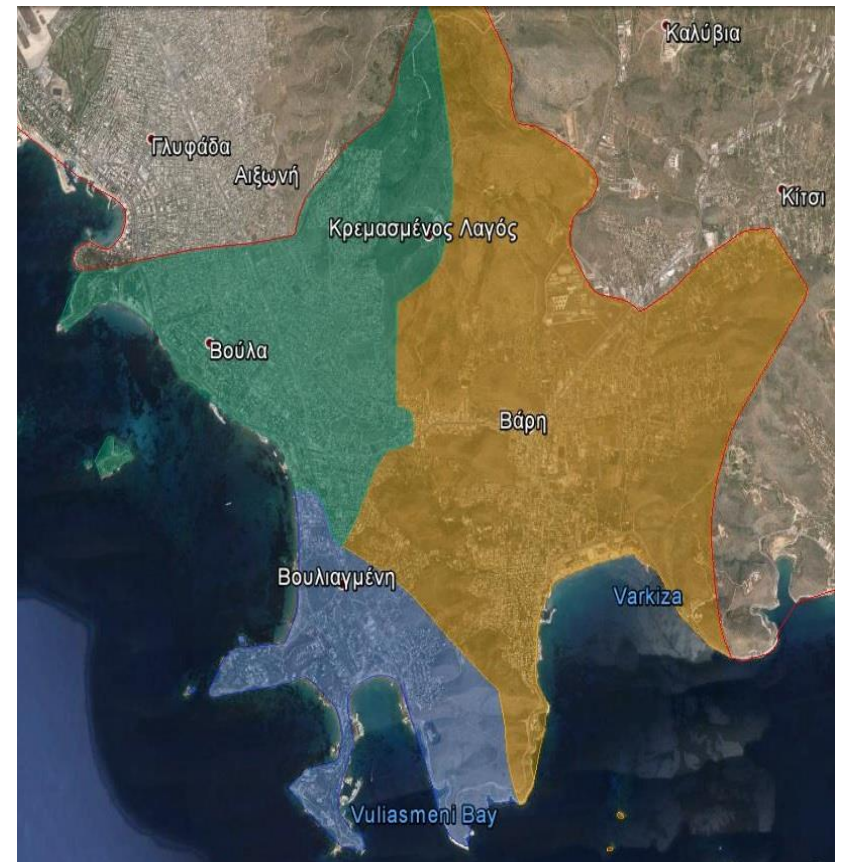
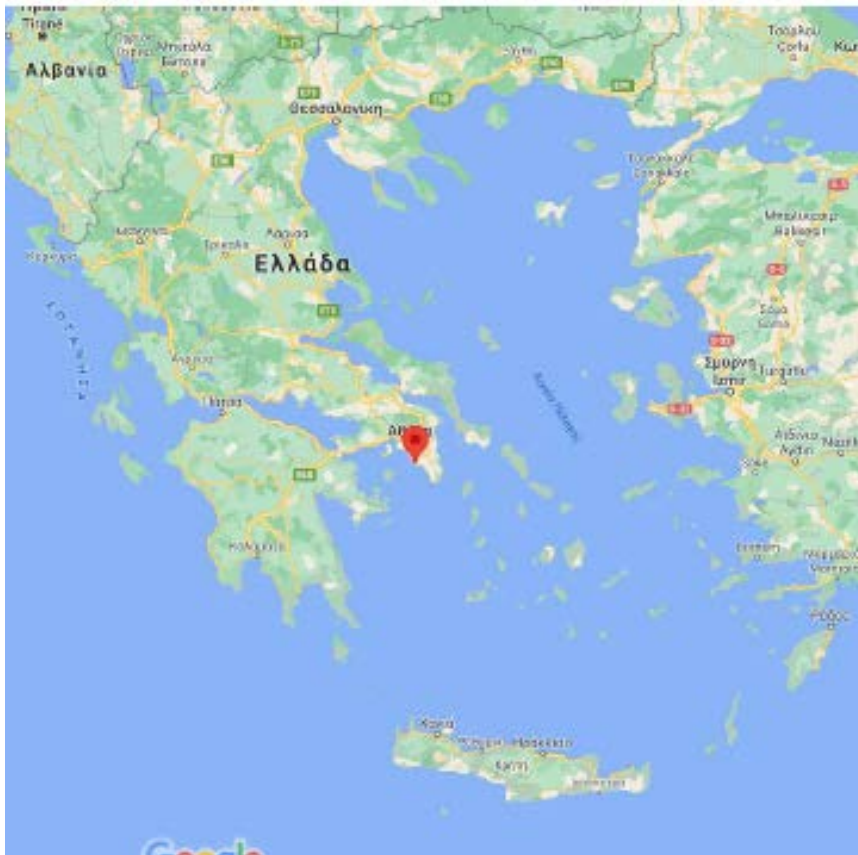
## **Main objectives of the methodology**

- Creation of local strategies, action plans and tools in order to increase the proportion of sorting in the waste source in order to promote reuse and recycling.
- Strengthening citizen participation in recycling systems and in circular economy
- **Improving citizens' income** through active participation in local recycling activities.
- Developing a common strategy for institutional reimbursement of recyclability in the field of waste recycling
- Sharing best practices and transferring knowledge to innovative solid waste management in local level.



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## Municipality of Vari Voula Vouliagmeni





## Population, Buildings, Residences

Table 1. Population data

The permanent population of the Municipality (Hellenic Statistical Authority, 2011)

City	Population
Vari	15.855
Voula	28.364
Vouliagmeni	4.180
Total	48.399

Table 2. Number of residences in buildings  
(Hellenic Statistical Authority, 2011)

Type	Buildings	Residences	% in total
Buildings with 1 residence	5.164	5.164	15,40%
Buildings with 2 residences	1.953	3.906	11,65%
Buildings with 3-5 residences	2.191	8.764	26,14%
Buildings with 6-9 residences	842	6.315	18,83%
Buildings with 10-19 residences	486	7.290	21,74%
Buildings with more than 20 residences	91	2.093	6,24%
Total	10.727	33.532	100,00%



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## Starting the circle of the Circular Economy Biodegradable waste / Greens (pruning)

VV Municipality collects Biodegradable waste / Greens (pruning) (code 20 02 01) from sidewalks with open vehicles, with or without grab, and loaders.



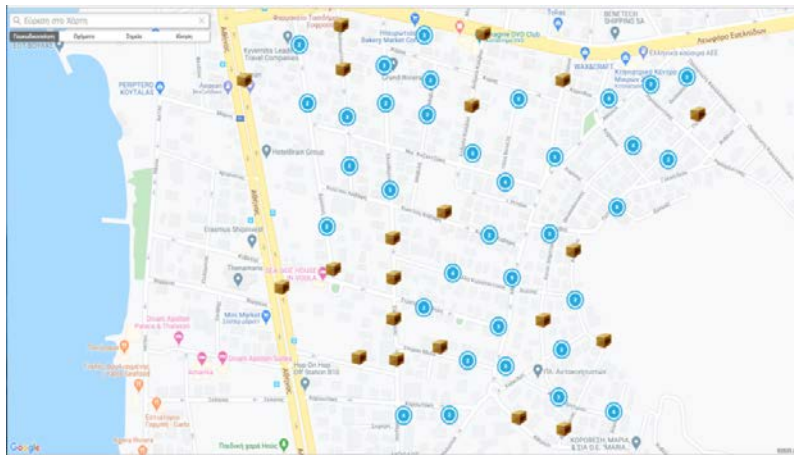


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## Continuing the circle of the Circular Economy Organic waste / Greens (pruning)

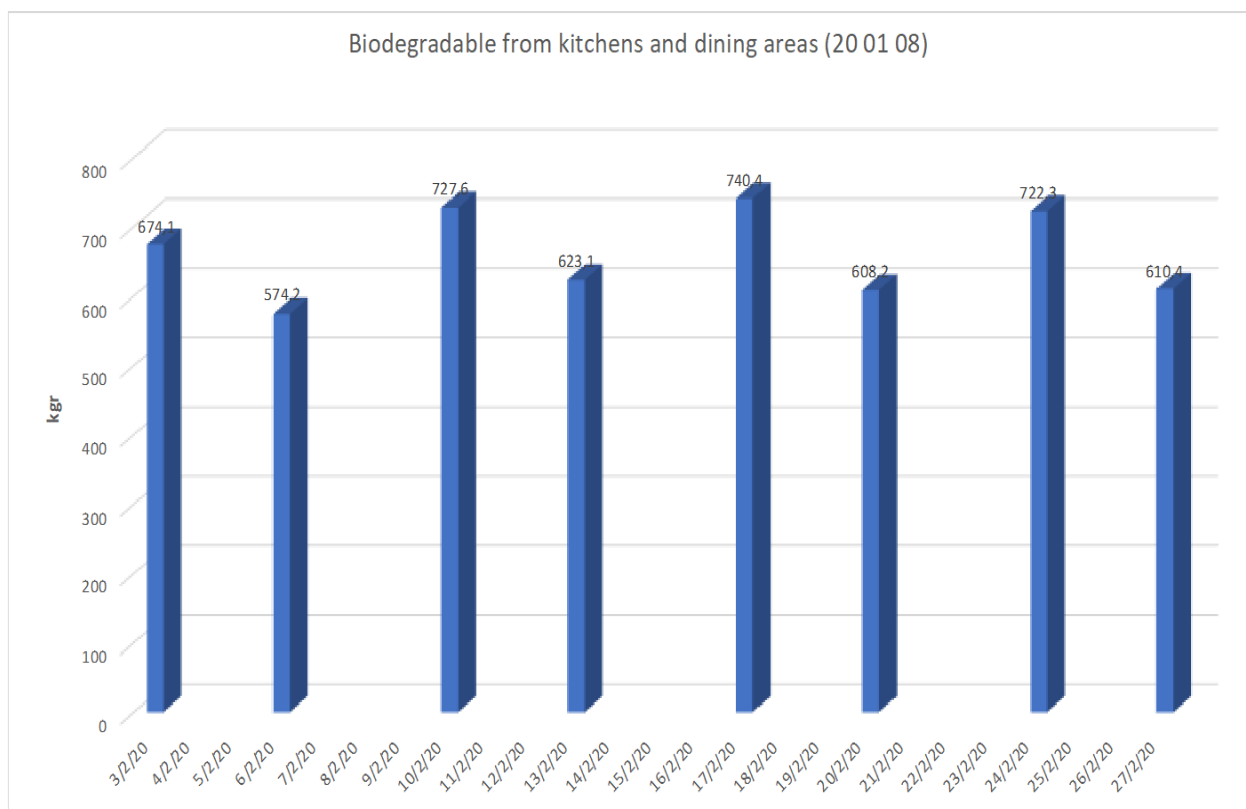
VVV Municipality distributes free of charge and places special brown bins for organic waste, equipped with Radio-Frequency Identification (RFID) tags, in order to collect the organic, also biodegradable, waste (code 20 01 08). When the garbage collector collects waste from these bins, a municipal database is automatically updated on the quantity, location and time of collection. Every waste producer that separates its organic waste is credited with assigned benefit points

At Pigadakia area there are 1248 households in 663 buildings. At each building, a brown bin (120 or 240 liters) is placed to separate organic waste at source. Municipal vehicles collect the content of the brown bins, weigh and identify each bin and transfer this information to the municipality database.





## The daily results of brown bins collection and weighing







## More detailed data, for each household / business

Table 3. Biodegradable from kitchens and dining areas (20 01 08) of four households

Date	Household 1 (Kgr)	Household 2 (Kgr)	Household 3 (Kgr)	Household 4 (Kgr)
2020-02-03	15,00	0,00	0,00	14,00
2020-02-06	11,40	10,60	5,30	0,00
2020-02-10	7,10	9,10	16,50	0,00
2020-02-13	4,30	2,90	2,40	2,60
2020-02-17	1,70	0,00	7,30	5,50
2020-02-20	4,20	0,00	0,00	1,20
2020-02-24	3,60	9,80	13,00	3,60
2020-02-27	2,50	0,00	3,90	0,80
Total	49,80	32,40	48,40	31,00



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## Continuing the circle of the Circular Economy

Under the scientific supervision of the National and Kapodistrian University of Athens - Department of Chemistry (Prof. K. Chassapis) VVV Municipality produces biocatalytic peat alternative soil substrates, **VITA GREEN** and **VITA GREEN plus**. These soil conditioners, which are first-class soil conditioners (A + and A), suitable for use in organic farming in accordance with the requirements of Reg. (EC) 834/2207 & 889/2008, as attested by 28056-6 / 19 CERTIFICATION OF CONFORMITY of DIO, Inspection and Certification Organization of Organic Products. Soil conditioners are classified according to INTERNATIONAL STANDARDS and their physicochemical characteristics as BLACK HUMIDIC PEPPER (ASTM D2607-69)



### ΒΕΒΑΙΩΣΗ ΣΥΜΜΟΡΦΩΣΗΣ AFFIRMATION OF CONFORMITY



Ο Οργανισμός ΔΙΟ, μετά την ανασκόπηση της σχετικής τεκμηρίωσης που παραλήφθηκε από την επιχείρηση /  
DIO Organization, based on review of documentary evidence sent by the company:

**ΔΗΜΟΣ ΒΑΡΗΣ-ΒΟΥΛΑΣ-ΒΟΥΛΙΑΓΜΕΝΗΣ**  
**MUNICIPALITY OF VARIS-VOULAS-VOULIAGMENIS**

Δ/ση / Address: Λεωφόρος Κωνσταντίνου Καραμανλή 18, 16673 Βούλα Αττικής  
18 Konstantinos Karamanlis Avenue, Voula, Attiki, GREECE 16673

Βεβαιώνει ότι τα παρακάτω οκτώ (8) είδη είναι κατάλληλα για χρήση στη βιολογική γεωργία, σύμφωνα με τις απαιτήσεις των Καν. (ΕΚ) 834/2007 & 889/2008 /  
Confirms that the inputs listed below are suitable for use in organic agriculture, in agreement with the requirements of Reg. (EU) 834/2007 & 889/2008:

#### VITA-GREEN, VITA-GREEN PLUS

(βλ. αναλυτική περιγραφή στη σελ.2 του παρόντος / see page 2 of this certificate for detailed list)  
Η παρούσα Βεβαίωση Συμμόρφωσης δίδεται από τους όρους του αντίστοιχου επίσημου οικονομικής προσηφοράς που έχει υπογραφεί από το δικό μέρος και αποτελεί επίσημο και νόμιμο έγγραφο συμβατότητας /  
This Certificate of Confirmation is subject to corresponding financial bid form signed by both parties and is a formal and complete private agreement.

Αρ. Πρωτοκόλλου/Certificate Reference no. **23187-6/20**

Ημ/νία Έγκρισης/Valid since **23-10-2020**

Ημ/νία Λήξης/Valid until **23-10-2021**

Αθήνα / Athens . **23/10/2020**



Για τον Οργανισμό ΔΙΟ / For DIO Organization  
Δημήτριος Δημητριάδης / Dimitrios Dimitriadis  
Γενικός Διοικητής / General Manager



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## Continuing the circle of the Circular Economy Separate Collection of Recyclable Packaging Materials

Since the beginning of 2019, the Municipality of VVV distribute to the citizens bags with QRcode, different for paper (code 20 01 01) and different for PMD (Plastic – Metal – Drinkable packaging (code 15 01 06).

**The citizens fill the bags with recyclable materials that be collected by Municipality door to door.** The QRcodes are uploaded on a platform that identifies the person who is the owner of the bags and benefit points are assigned. Benefit points reward every participant Each participant (household or businnes representative) is rewarded currently with a 50 liter VITA GREEN or VITA GREEN plus free bag





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## Solid waste production at Vari – Voula - Vouliagmeni

Table 4. Solid Waste in VVV Municipality  
(National Electronic Waste Register )

Kind (Code)	Quantity (tn) (2017)	% (2017)	Quantity (tn) (2016)	% (2016)
Mixed packaging of recyclable materials (15 01 06)	1.588,59	4,32%	1.624,89	4,31%
Biodegradable waste / Greens (pruning) (20 02 01)	1.145,18	3,11%	266,74	0,71%
Mixed urban waste (20 03 01)	33.210,87	90,23%	35.090,64	93,01%
Others (13 02 05, 15 01 07, 16 01 03, 16 01 04, 17 01 07, 17 09 04, 20 01 10, 20 01 35, 20 01 36)	862,89	2,24%	743,72	1,97%
Total	<u>36.807,53</u>	<u>100,00%</u>	<u>37.725,99</u>	<u>100,00%</u>



## Solid waste production at Vari – Voula - Vouliagmeni

Since 2018 we have started to have separate measurements for paper and cardboard and biodegradable from kitchens and dining areas (organics).

Table 5. Solid Waste in VVV Municipality  
 (National Electronic Waste Register )

Kind (Code)	Quantity (tn) (2019)	% (2019)	Quantity (tn) (2018)	% (2018)
Mixed packaging of recyclable materials (15 01 06)	1.739,16	3,93 %	1.598,32	4,13%
Paper and cardboard (20 01 01)	18,00	0,04%	2,63	0,01%
Biodegradable from kitchens and dining areas (20 01 08)	1.505,78	3,40%	14,65	0,04%
Biodegradable waste / Greens (pruning) (20 02 01)	6.732,15	15,20%	4.937,52	12,75%
Mixed urban waste (20 03 01)	33.230,66	75,05%	30.711,87	79,28%
Others (13 02 05, 15 01 07, 16 01 03, 16 01 04, 17 01 07, 17 09 04, 20 01 10, 20 01 35, 20 01 36)	1.052,78	2,38%	1.466,80	3,79%
<b>Total</b>	<b>44.728,53</b>	<b>100,00%</b>	<b>38.731,79</b>	<b>100,00%</b>



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## Solid waste production at Vari – Voula - Vouliagmeni

Table 6. Buried Solid Waste in VVV Municipality  
(National Electronic Waste Register )

Buried/ Non Buried Waste	2019	2018	2017	2016
Percentage of buried waste	75,05%	79,20%	90,23%	93,01%
<b>Percentage of non-buried waste</b>	<b>24,95%</b>	<b>20,71%</b>	<b>9,77%</b>	<b>6,99%</b>
Total	100,00 %	100,00 %	100,00 %	100,00 %



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## **The sale of VITA - GREEN & VITA - GREEN plus** **Closing the circle of the Circular Economy**

VVV Municipality managed to put into practice the "circular economy" and complete the financial viability of the action, **placing on the market through a public open auction 10.000 bags of soil conditioner, closing the economic cycle and adding revenue to the municipal budget.**

In addition, **1-2 bags of soil conditioner are available every month, free of charge, to the residents of the Municipality who participate in the recycling actions.**

More than 700 citizens have received species of soil conditioner so far.



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## Conclusions

The **new methodology, the matching of waste producer with solid waste generation in the city of Vari – Voula – Vouliagmeni** , increases the waste quantities that pre-selected / recycled –/ composted, with a lot of economic benefits.

The obvious result is the reduction of landfill taxes and fines because of the decrease of quantities of unprocessed waste leaded to burial. **24,95 % , or 11.047,87 tones of waste were diverted from landfill in 2019, 8.412,52 tones more than 2016, a year in which we did not apply this methodology.**

**The environmental footprint of this effort is positive.** The participation of citizens, businesses and organizations in the Municipality's activities under the philosophy of positive reward, has already significant effects and will be a bridge between the current situation and the future where, on the basis of the European waste strategy, the diversion from the landfill is a one-way street.

More spectacular results are expected next years as the distribution of brown bins with RFID and recycling bags with QRcode will be increased.

The target is to cover 10.727 buildings and 33.532 households.





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## Acknowledgements

I am particularly grateful for the assistance given by  
the Mayor of Vari – Voula \_ - Vouliagmeni, Dr. Grigorios Konstantellos



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Please visit the site  
<http://vvv.gov.gr/zerowaste>

**THANK YOU !**

**Dr. Miltiadis Kavrakos,**  
**Director of Waste Management and Recycling Unit**  
**Municipality of Vari – Voula - Vouliagmeni**  
**email: [mkavrakos@vvv.gov.gr](mailto:mkavrakos@vvv.gov.gr)**