# ESTADO Y PERSPECTIVAS FUTURAS DE LA VALORIZACIÓN ENERGÉTICA EN ESPAÑA

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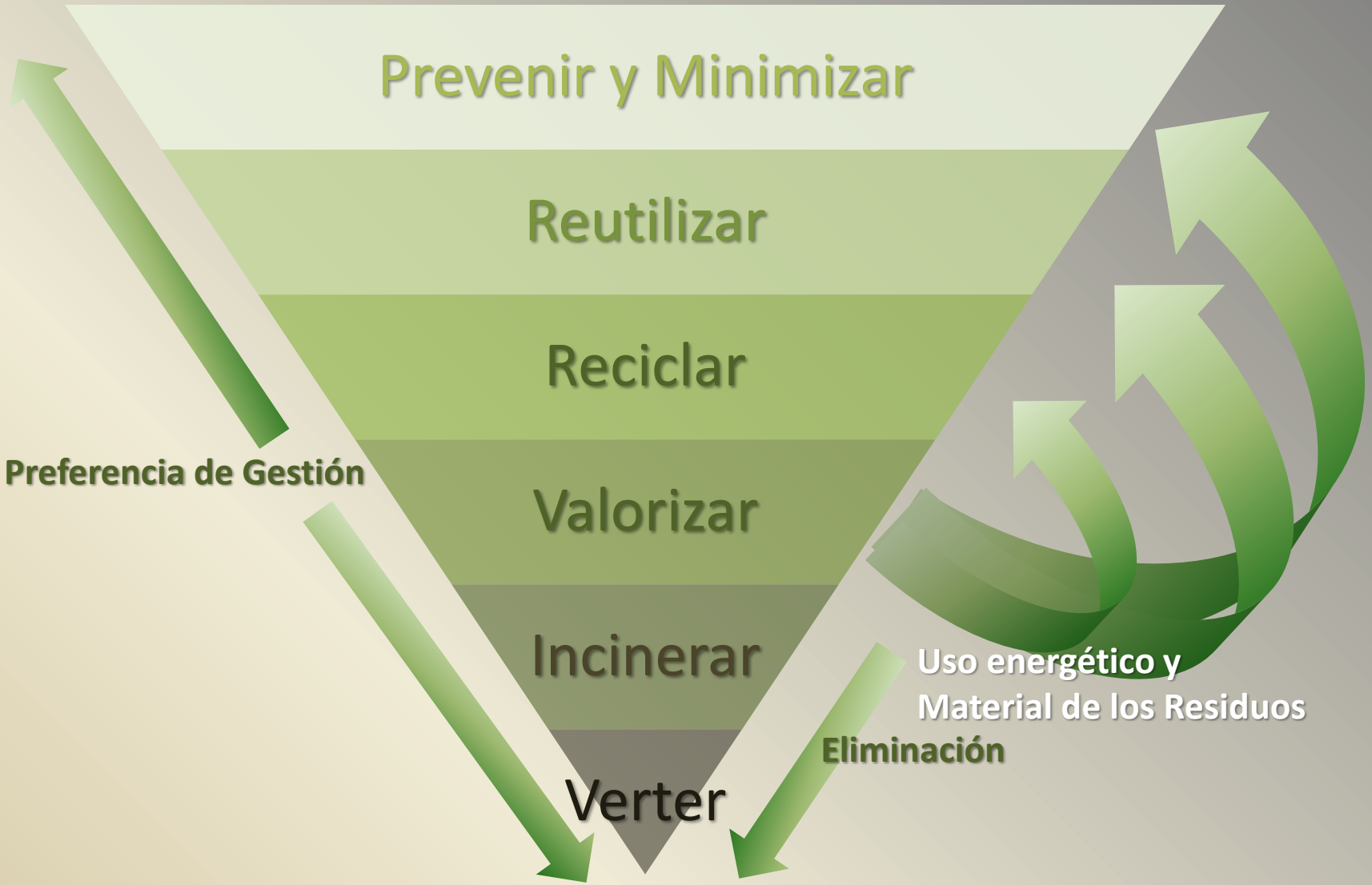
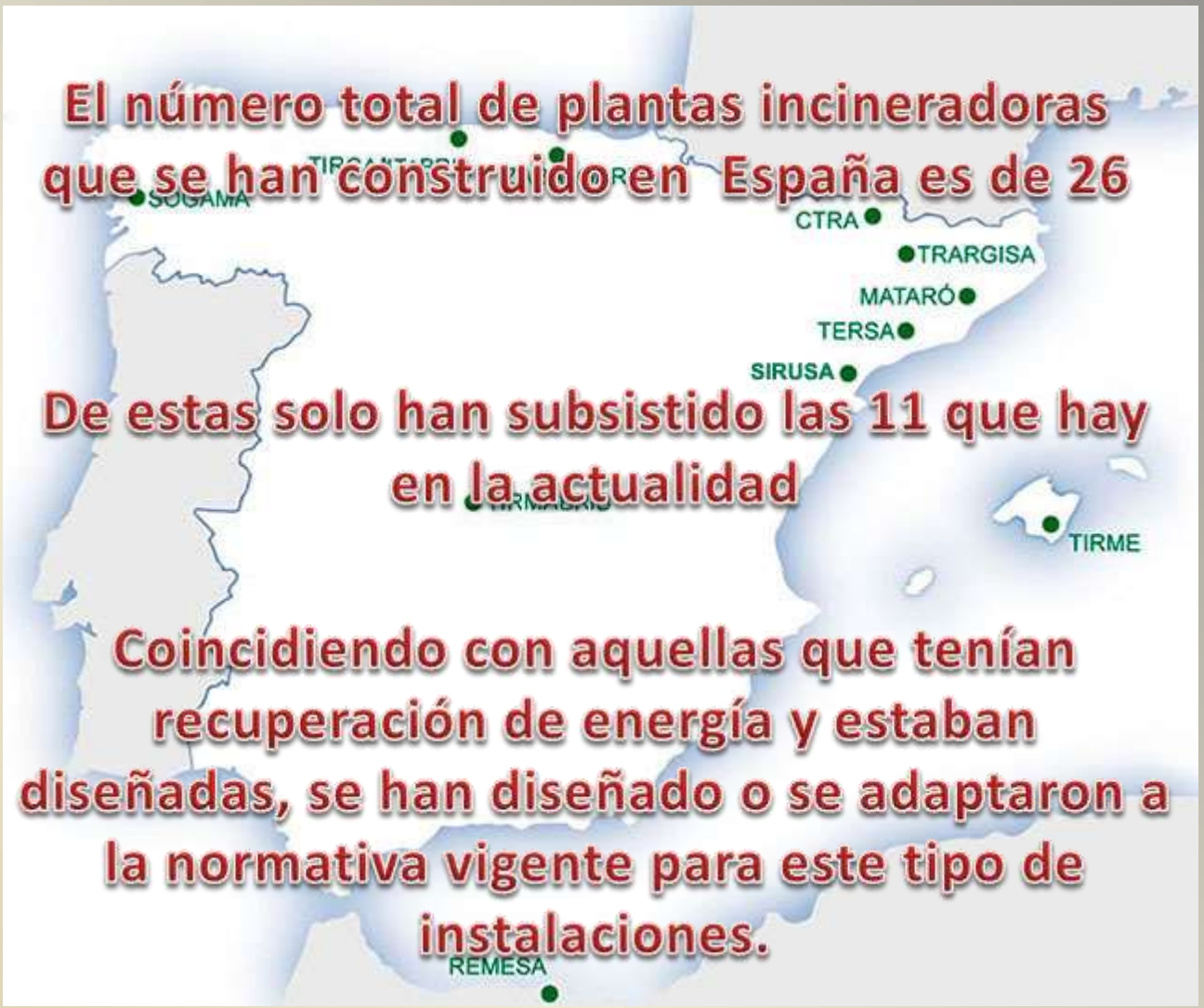

Prevenir y Minimizar
Reutilizar
Reciclar
Valorizar
Incinerar
Verter
Preferencia de Gestión
Uso energético y
Material de los Residuos
Eliminación


Prevenir y Minimizar
Reutilizar
Rechazo de Plantas
No recuperables
Impropios
Tóxicos
Preferencia de Gestión
Valorizar
Uso energético y
Material de los Residuos
Incinerar
Eliminación
Verter

# WtE en ESPAÑA

# Plantas de VE en España y Andorra



# Plantas de VE en España y Andorra

# Plantas de VE en España y Andorra


**5 Plantas gestionadas por empresas públicas y 2 por empresa de economía mixta.**

**5 Plantas gestionadas por empresas privadas en régimen de concesión**

562.142 Tm/año
74,8 MWe
255.474 MWh/año
351 Empleos

**Mallorca** (TIRME)

230.813 Tm/año
94 MWe
475.452 MWh/año
71 Empleos

**Bilbao** (Zabalgarbi)

328.680 Tm/año
29,8 MWe
102.530 MWh/año
104 Empleos

**Madrid** (TIRMADRID)

603.439 Tm/año
50 MWE
332.761 MWh/año
80 Empleos

**Cerceda** (SOGAMA)

43.108 Tm/año
2,7 MWe
9.043 MWh/año
18 Empleos

**Melilla** (REMESA)

358.010 Tm/año
23,7 MWe
128.278 MWh/año
82 Empleos

**Sant Adrià del Besòs** (TERSA)

114.386 Tm/año
10,5 MWe
77.021 MWh/año
156 Empleos

**Meruelo** (Planta Cantabria)

131.152 Tm/año
7,4 MWe
47.070 MWh/año
51 Empleos

**Tarragona** (SIRUSA)

158.429 Tm/año
13,2 Mwe
57.757 MWh/año
100 Empleos

**Mataró** (CONSORCI DEL MARESME-TEM)

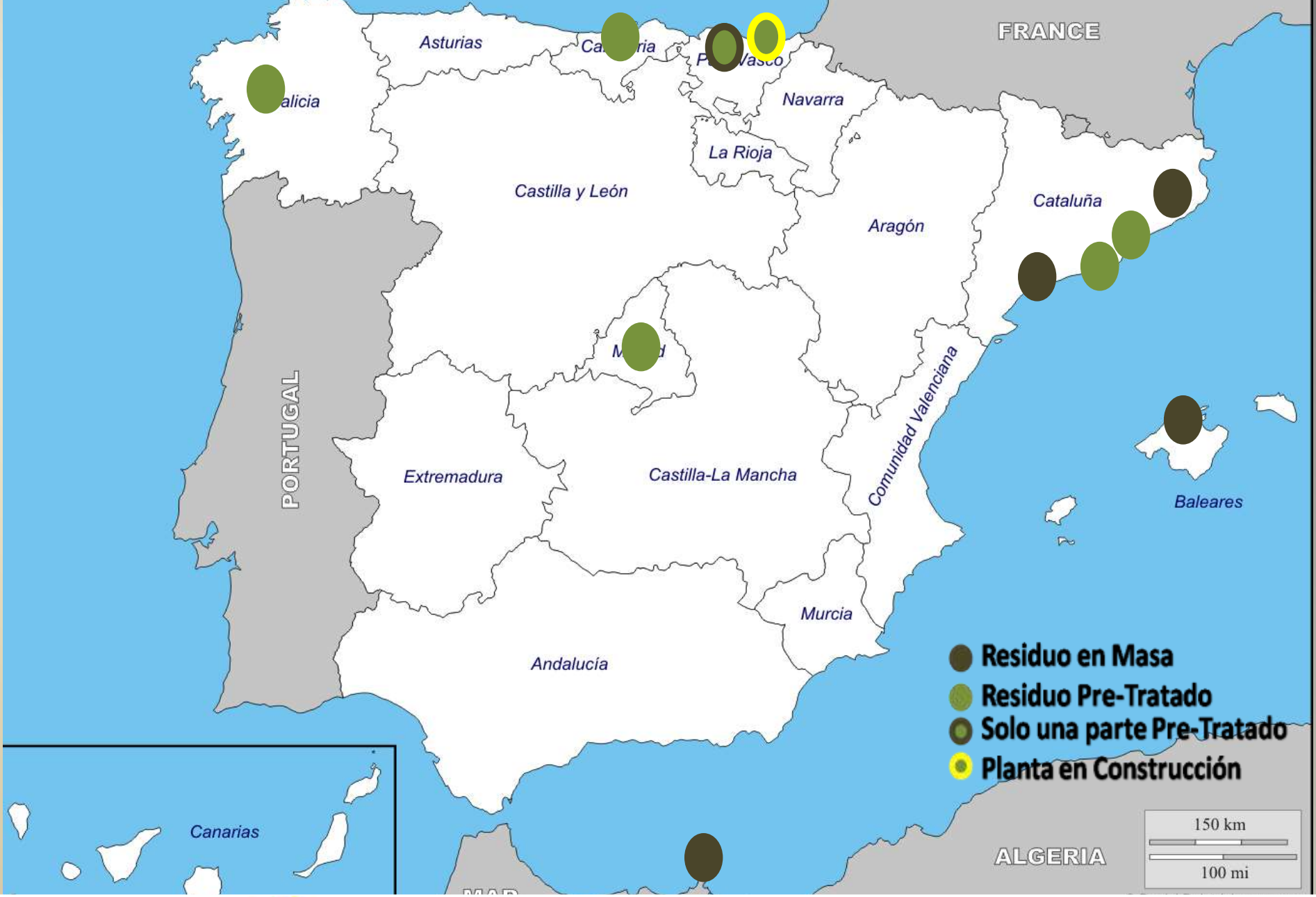
51.133 Tm/año
6,6 MWe
11.700 MWh/año
29 Empleos

**Andorra** (CTRA)

35.000 Tm/año (*)
3 MWe
28 MWh/año
25 Empleos

**Girona** (TRARGISA)

| PLANTS | CAPACITY (t/year) | 2018 | |
|---|---|---|---|
| MALLORCA (TIRME) | 690 | 562 | 128 |
| MADRID (TIRMADRID) | 315 | 329 | -14 |
| MELILLA (REMESA) | 48 | 43 | 5 |
| BILBAO (ZABALGARBI) | 230 | 231 | -1 |
| MERUELO (CANTABRIA) | 96 | 114 | -18 |
| CERCEDA (SOGAMA) | 600 | 603 | -3 |
| SANT ADRIÀ DEL BESÒS (TERSA) | 360 | 358 | 2 |
| MATARÓ (CONSORCI-TEM) | 160 | 158 | 2 |
| TARRAGONA (SIRUSA) | 144 | 131 | 13 |
| GIRONA (TRARGISA) | 35 | 0 | 35 |
| ANDORRA (CTRA) | 60 | 51 | 9 |
| **TOTAL** | **2.738** | **2.581** | **157** |




aeversu
Convertimos residuos en energía

AVALER

# A Valorização Energética de Resíduos no contexto da Transição Energética e da Economia Circular. Contributos para os Decisores

**Table A1.5 Timeline for the new objectives and targets for waste, 2013–2050**

| Objectives | Sources | Deadline for implementation |
|---|---|---|
| Landfilling is limited to non-recyclable and non-recoverable waste. | Decision 1386/2013/EU | ⇒2020 |
| Increase the rate of packaging waste prepared for reuse and recycled to 65 % (interim target). | 2015 Circular Economy Package | ⇒2025 |
| Increase reuse and recycling of municipal waste to a minimum of 65 % (interim target). | 2015 Circular Economy Package | ⇒2025 |
| Minimum targets by weight for preparing for reuse and recycling:<br>• 55 % of plastic;<br>• 60 % of wood;<br>• 75 % of ferrous metal;<br>• 75 % of aluminium;<br>• 75 % glass;<br>• 75 % paper and cardboard. | 2015 Circular Economy Package | ⇒2025 |

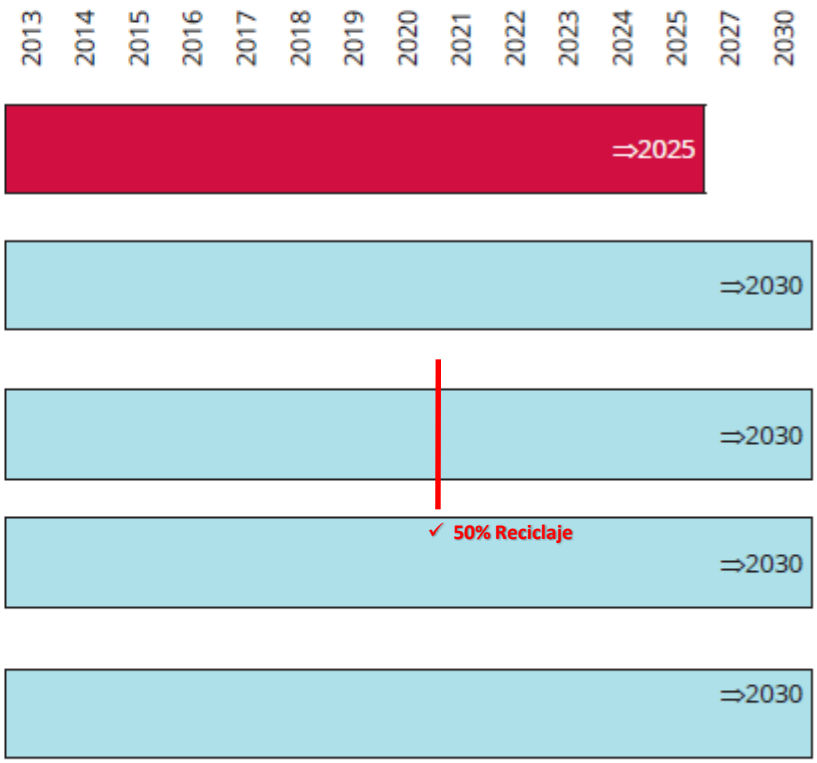
2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2027 2030

✓ RMB a Vertedero

✓ 50% Reciclaje

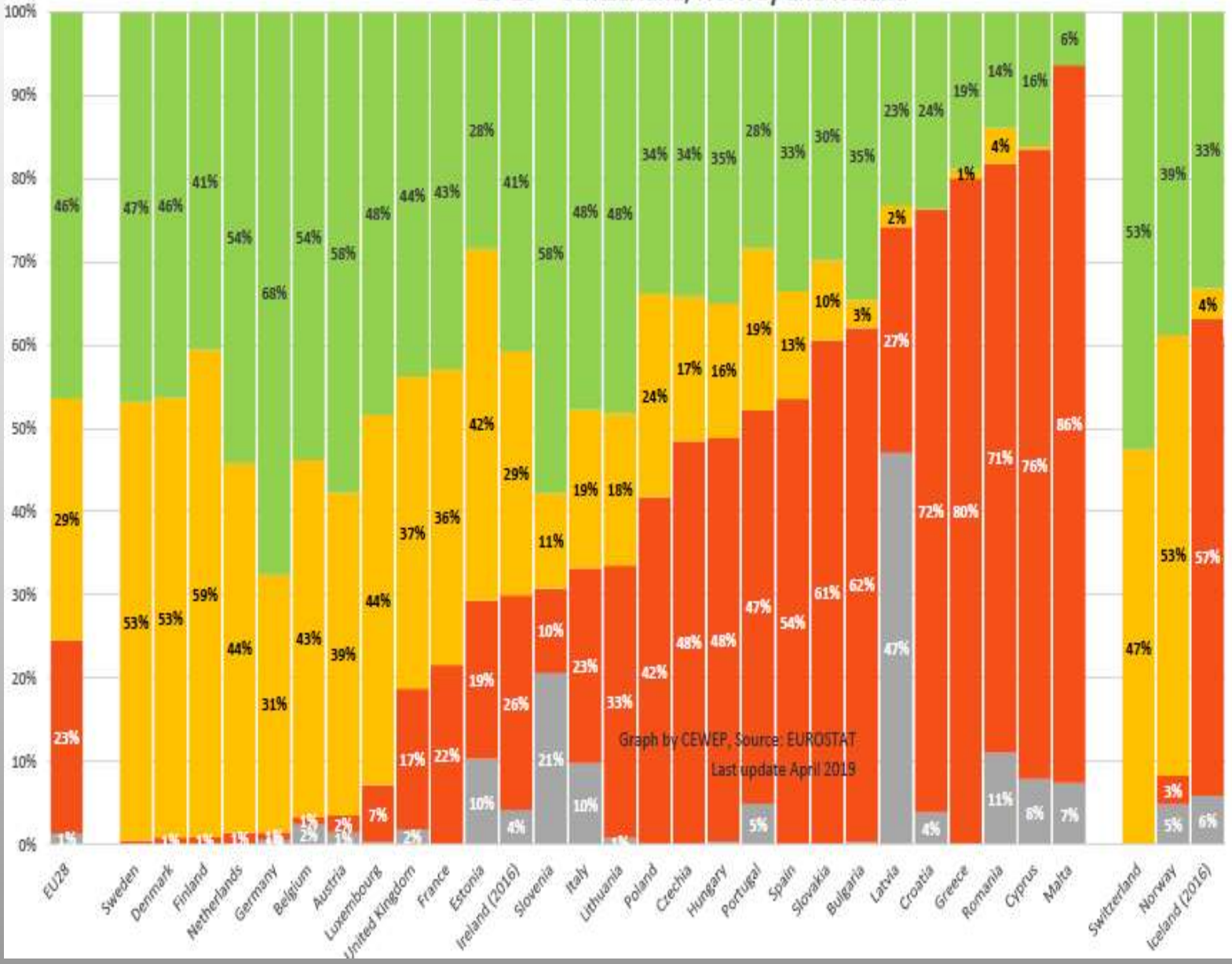
**Table A1.5 Timeline for the new objectives and targets for waste, 2013–2050**

| Objectives | Sources | Deadline for implementation |
|---|---|---|
| Reduction in the consumption of lightweight plastic carrier bags (2018–2025) (*). | Directive 94/62/EC as amended by Directive 2015/720/EU | ⇒2025 |
| Increase the rate of packaging waste prepared for reuse and recycled to 75 % (final target). | 2015 Circular Economy Package | ⇒2030 |
| ✓ Increase reuse and recycling of municipal waste to a minimum of 65 %. | 2015 Circular Economy Package | ⇒2030 |
| ✓ Reduce the amount of municipal waste landfilled to 10 % of the total amount of municipal waste generated. | 2015 Circular Economy Package | ✓ 50% Reciclaje ⇒2030 |
| Minimum targets by weight for preparing for reuse and recycling:<br>• 75 % of wood;<br>• 85 % of ferrous metal;<br>• 85 % of aluminium;<br>• 85 % glass;<br>• 85 % paper and cardboard. | 2015 Circular Economy Package | ⇒2030 |



# Municipal waste treatment in 2017

EU 28 + Switzerland, Norway and Iceland




Landfill

Waste-to-Energy

Recycling +Composting

Missing data

CEWEP

Percentages are calculated based on the municipal waste reported as generated in the country

2017

# 250 Millones de toneladas producidas

53,6%

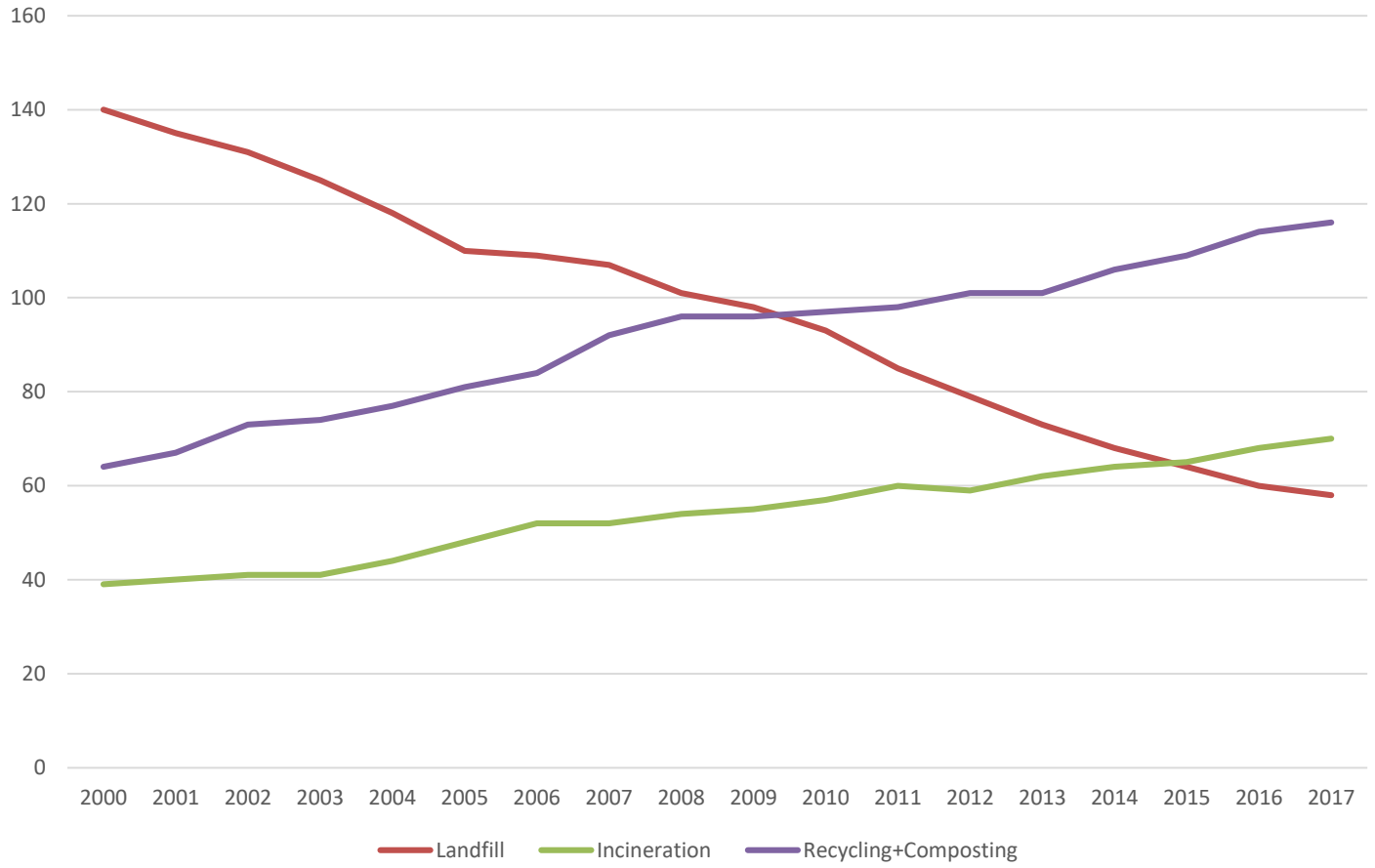
23% Destinado a vertedero

33,4%

46% Reciclaje

29% Valorización Energética

13%


160
140
120
100
80
60
40
20
0
2000
2001
2002
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2011
2012
2013
2014
2015
2016
2017
Landfill
Incineration
Recycling+Composting

# IMPLEMENTATION SCHEDULE


ISWA
International Solid Waste Association

# TECNOLOGIAS DE TRATAMIENTO TERMICO

| PARAMETER | ADVANCED MOVING GRATE | FLUIDISED BED | THERMAL GASIFICATION | PLASMA GASIFICATION | PYROLYSIS | TWO STAGE COMBUSTION |
|---|---|---|---|---|---|---|
| Number of plants in operation | >1,500 | ~40, smaller number when MSW only | Unclear when MSW only, but <10 outside Japan | Unclear when MSW only, but <10 | <10 | <10 |
| Size of modules tph | 2-40 | 20 | <10 | <10 | <10 | <10 |
| Waste limitation | No restrictions, wide range in waste quality | Shredded to <15 cm, removal of metals, narrow range in calorific value | Shredded to <15 cm, narrow range in calorific value/moisture | Shredded to <15 cm, narrow range in calorific value/moisture | Shredded to <15 cm, narrow range in calorific value/moisture | Shredded to < 15 cm, removal of metals narrow range in calorific value |
| Reported annual availability | ≥8,000 h/y | <7,500 h/y | <5,500 h/y, but limited data available | Insufficient data available | Insufficient data available | <7,000 h/y |
| Proven, commercial operation >3 years | Numerous plants, well documented operation | Few facilities on MSW only | Limited operational data published | Limited operational data published | Limited operational data published | Few, if any after latest re-design |
| Require flue gas treatment | Yes | Yes | Yes | Yes | Yes | Yes |
| Process residues | Approx. 18-25% bottom ash <5% IFA and flue gas treatment residues | Approx. 18-25 % bottom ash, but potentially higher fraction of IFA | Limited data available Potentially vitrified IBA | Limited data available | Limited data available | Limited data available, potentially IBA and IFA similar to the moving grate combustion |
| Energy usage for pre-treatment | None | Limited data, estimate 50 kW/t | Limited data, estimate 50 kW/t | Limited data, estimate 50 kW/t | Limited data, estimate 50 kW/t | Limited data, estimate 50 kW/t |
| Net electricity production (incl. pre-treatment) | 500-700 kWh/t | 450-550 kWh/t | Limited data available 0-250 kWh/t | Limited data available <100 kWh/t | Limited data available <100 kWh/t | 250-300 kWh/t |
| Investment cost | 500-900 USD/t yearly capacity | 700-900 USD/t yearly capacity | Limited data available | Limited data available | Limited data available | Limited data available |
| Gate-fee per ton of waste | 30-100 USD/t depending on opportunity for sale of energy | 30-100 USD/t depending on opportunity for sale of energy | Limited data available, according to information from Japan and Italy approx. 300-500 USD/t | Limited data available (project experience shows that >80-100 USD/t with power price of 100 USD/MWh is not sufficient) | Limited data available | Limited data available |

ISWA
International Solid Waste Association

LA VALORIZACION ENERGÉTICA DEBE SER LA OPCIÓN PREFERENTE A CUALQUIER OTRO SISTEMA DE DISPOSICIÓN FINAL DE LOS RESIDUOS CUANDO SOBRE ESTOS SE HA AGOTADO LA CAPACIDAD DE RECUPERAR LOS MATERIALES RECICLABLES QUE CONTIENEN.

ES EL UNICO SISTEMA DE DISPOSICION FINAL QUE DA VALOR AL RESIDUO AL OBTENER ENERGIA DE ELLOS.

ES UNA SOLUCION ESTRATEGICA Y EFICAZ FRENTE A LAS GRANDES CONCENTRACIONES DE POBLACION QUE SE ESTA PRODUCIENDO EN LAS GRANDES URBES DEL PLANETA, EL INCREMENTO DE PRODUCCION DE RESIDUOS QUE SE DEBE GESTIONAR Y LA DEMANDA ENERGETICA REQUERIDA.

ES UNA TECNOLOGIA RESPETUOSA MEDIOAMBIENTALMENTE CON EXHAUSTIVO CONTROL DE LAS EMISIONES PRODUCIDAS EN SU PROCESO. SOBRETODO EN CONTRAPUNTO A LAS EMISIONES PRODUCIDAS EN VERTEDERO Y POR ESTAR ACEPTADA COMO ENERGIA RENOVABLE HASTA EL 50% DE LA PRODUCCION ELECTRICA DE LAS MISMAS.

DENTRO DE LOS TRATAMIENTOS TERMICOS LA INCINERACION CON VALORIZACION ENERGETICA DISPONE DE MULTIPLES REFERENCIAS QUE LA AVALAN COMO LA TECNOLGIA MAS CONTRASTADA Y FIABLE.

LA VALORIZACION ENERGETICA DEBE OCUPAR UN PAPEL FUNDAMENTAL EN LOS MODELOS DE GESTION DE RESIDUOS DE CUALQUIER PAIS Y HA DE SER INTRODUCIDA SIEMPRE COMO ALTERNATIVA AL VERTEDERO . PERO NO ES LA SOLUCION, TAN SOLO EL ULTIMO ESLABON PARA LA CORRECTA GESTION DE LOS RESIDUOS DENTRO DE LAS TECNOLOGIAS DISPONIBLES EN LA ACTUALIDAD.