



WWF

REPORT

2019

A Plastic System Guidebook for FRANCE

A practical guide for policy makers

EXECUTIVE SUMMARY

FRANCE GENERATES THE MOST PLASTIC WASTE IN THE MEDITERRANEAN REGION AND FACES PLASTIC RECYCLING CHALLENGES, GIVEN 76 OF WASTE IS INCINERATED OR LANDFILLED

France generated 4.5MT of plastic waste in 2016, equivalent to 66 kgs of plastic per person. The waste management system collected 4.4MT (98%), and 0.1MT (2%) was left uncollected. France has not made as much progress on recycling as its neighboring countries, ranking 5th for recycling domestic plastic waste in 2016 (22% of all waste). 3.4MT of waste is incinerated (1.8MT) or ends up in landfills (1.6MT). Uncollected waste led to 80kT of plastic leaking into nature. 11.2kT of plastic leaked into nature enters the Mediterranean each year, with coastal activities contributing to 79% of this waste. The three highest coastal polluters into the Mediterranean sea are the bay of Marseille, city of Nice and Island of Corsica. France's economy loses an estimated €73M annually due to plastic pollution, as it affects the tourism, shipping and fishing economies.

FRANCE SHOULD PRIORITIZE WASTE REDUCTION, INCENTIVIZATION OF PRODUCT REUSE, AND RECYCLABILITY OF PLASTICS TO CREATE A CIRCULAR FRENCH PLASTICS ECONOMY

Despite lower levels of mismanaged waste compared to other Mediterranean countries, France still contributes to plastic leaking into nature due to its high plastic consumption. Current policies offer limited action toward reducing plastic production and use. Policy priorities should aim to reduce consumption, improve durability and reusability plastic products by encouraging reuse business models, and incentivize plastic recycling through expanded ERP. France should implement, and go beyond, the EU single-use directive requirements to reduce consumption. Monitoring and enforcement of this directive should be in place to hold the plastics industry accountable. Scaling recycling is another critical element, which requires market interventions to remove the barriers that are preventing investment, such as use of additives, non-standardized packaging measurements, and multi-material product designs. Overall, France must set ambitious targets to reduce plastic pollution and will need bolder action across these areas to reach its goals.

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Front cover

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1. MAPPING THE LIFECYCLE OF PLASTIC IN FRANCE

- Value chain analysis of plastics’ lifecycle from production to waste management
- Evaluation of the main sources of plastic leakage into Nature

2. UNDERSTANDING THE IMPACT OF PLASTIC IN FRANCE

- Overview of the impact of plastic on the country’s environment and economy
- Spotlight on the top Mediterranean hotspots

3. EVALUATING THE POLICY LANDSCAPE REGARDING PLASTIC IN FRANCE

- Review of the existing policy landscape and initiatives to curb plastic pollution
- Roadmap to recommended future interventions

ANNEX

- Plastic waste system activities causing controlled and mismanaged waste
- Acronyms and Glossary
- Methodology Overview

National facts:



population
66.9 MILLION
REGISTERED CITIZENS (2016)
3rd BIGGEST MEDITERRANEAN COUNTRY
BY POPULATION SIZE



economy
€2,456 BILLION
GDP (2016)
6th LARGEST NOMINAL GDP IN THE WORLD
LARGEST ECONOMY IN THE REGION



territory
632,734 km²
INCLUDING 1 MAJOR ISLAND,
SURROUNDED BY 8 COUNTRIES
1,694 km OF COASTLINE
ON THE MEDITERRANEAN SEA

Plastic footprint overview:



plastic goods production
5.7 MT PLASTIC GOODS
PRODUCED (2016)¹
~1.4% GLOBAL PLASTIC
PRODUCED IN FRANCE



plastic manufacturing
4.5 MT/YEAR OF PLASTIC WASTE
(OF WHICH 4.4 M T/YEAR COLLECTED)
~2.5 MT PLASTIC WASTE
FROM PACKAGING INDUSTRY

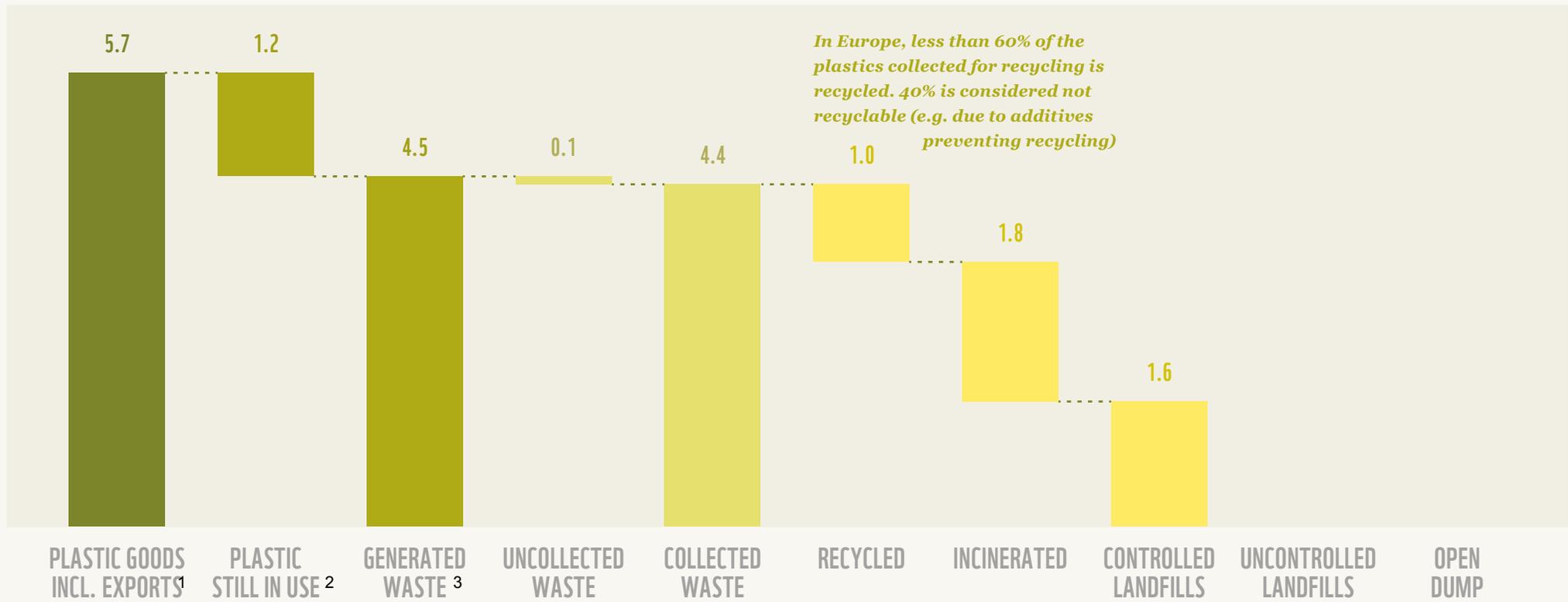


end of life management
3.4 MT UNDERGOES LINEAR WASTE
TREATMENT, primarily through controlled
landfills and incineration
1.0 MT RECYCLED (2015)
OF WHICH
~0.4 MT EXPORTED FOR RECYCLING

**FRANCE IS THE
3RD LARGEST
PLASTIC GOODS
PRODUCER
AND THE LARGEST
WASTE GENERATOR
IN THE REGION**

¹ Includes plastic materials (thermoplastics and polyurethanes) and other plastics (thermosets, adhesives, coatings and sealants). Does not include: PET fibers, PA fibers, PP fibers and polyacryls-fibers.

PLASTIC LIFECYCLE



¹ Two main actors are needed to produce plastic goods for consumption: i. Virgin plastics producers; and ii. Manufacturers/converters of virgin plastic into a plastic good. This total production figure includes all plastic products manufactured using local and imported virgin plastic material
² These are plastic goods produced with a mean product lifetime greater than 1 year, and/or exported for consumption in another country
³ This figure includes waste with a mean product lifetime from 1 year (or less) to 35 years
 Source: PlasticsEurope 2018, Jambeck & al (2014), World Bank (2018), European Environmental Agency, 2014, "Horizon 2020 Mediterranean Report."

PLASTIC LIFECYCLE IN 2016



Source: PlasticsEurope 2018, Jambeck & al (2014), World Bank (2018), European Environmental Agency, 2014, "Horizon 2020 Mediterranean Report. Dalberg analysis. ADEME, « Déchets. Chiffres Clés », 2017.

PLASTIC WASTE MANAGEMENT

- **The French waste management system planning is led by the Ministry of Ecology** through the national plan of prevention of waste production (2014-2020)
 - The national plan is supported by targeted regional plans
 - The Environmental and Energy management Agency (ADEME) provides technical support in the design and monitoring of the system
- **The operational responsibility of waste management is led by municipalities**, including collection, transport and disposal of waste.
 - The service may be provided by the municipalities, or delegated to a public agency of intercommunal cooperation or to a private group through an extended producer responsibility (EPR) framework
 - 38Mt of household waste collected in 2015, 75% of which were collected, recycled, or incinerated.

- 61% of non-hazardous industrial waste is incinerated while 30% is recycled provides technical support in the design and monitoring of the system
- **The 2015 Law on the Energy transition increases the role of EPR in France**, following the EU dynamics
 - Around 20 ERP mechanisms currently exist in France, covering different types of waste, with 7,8 Mt of waste collected in 2017
 - Those mechanisms cater to European measures, but also cover national legislation, and voluntary engagement by businesses
 - One example is CITEO, focusing on improving collection, sorting and recycling as well as eco-design of household packaging and graphic paper, contracting with the French State to support businesses and coordinate the merge of recycling and design standards. Its pricing is designed to incentivize better eco-design practices.

22% OF FRENCH PLASTIC WASTE IS RECYCLED, WHILE 76% HAS A LINEAR FATE BY LANDFILL OR INCINERATION



Source: Dalberg analysis, Jambeck & al (2014), World Bank (2018), ADEME (2017): «Déchets chiffres clefs», ADEME (2017): «REP Panorama», CNID (2019), ORDIF (2013)

FRANCE
PLASTIC DEBRIS

**PLASTICS LIFECYCLE:
 10.2 kT LEAKED INTO
 THE MEDITERRANEAN
 SEA IN 2016, AND 23%
 ENDS UP ON THE COAST
 WITHIN A YEAR**

10.2 kT/year OF PLASTIC ENTERS THE MEDITERRANEAN SEA

FINAL DESTINATION OF PLASTIC DEBRIS IN SEA

SEA-BASED

Fisheries, aquaculture and shipping result in 9% of this plastic debris. Items include crab pots, mussel nets, shipping containers, etc.



9%

RIVERS

Rivers carry 12% (1.4kT) of France's marine plastic. The Rhone is the primary river causing marine plastic pollution in France.



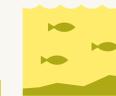
12%

COASTAL ACTIVITIES

Coastal activities cause 79% (8.8 kT) of plastic inputs into the sea resulting from poor city waste management practices, tourism and recreational activities. The coastal cities which produce the highest amount of plastic waste per year include: Marseille, Nice, and Corsica.



79%



11%

SEA BED

11% of plastics are deposited on the sea bed. Waste on sea beds becomes almost impossible to clean up.



21%

COASTLINE

21% of the plastic pollution leaked into the Mediterranean by France washes back onto its shores within a year



66%

SEA SURFACE

66% of plastic pollution remains in the sea 1 year after leakage

Source: Dalberg analysis, Jambeck & al (2014), World Bank (2018), Liubartseva et al "Tracking plastics in the Mediterranean: 2D Lagrangian model".

PLASTIC LIFECYCLE FOOTPRINT

The environmental impact of France’s production and consumption of plastic is lower than the Mediterranean average:

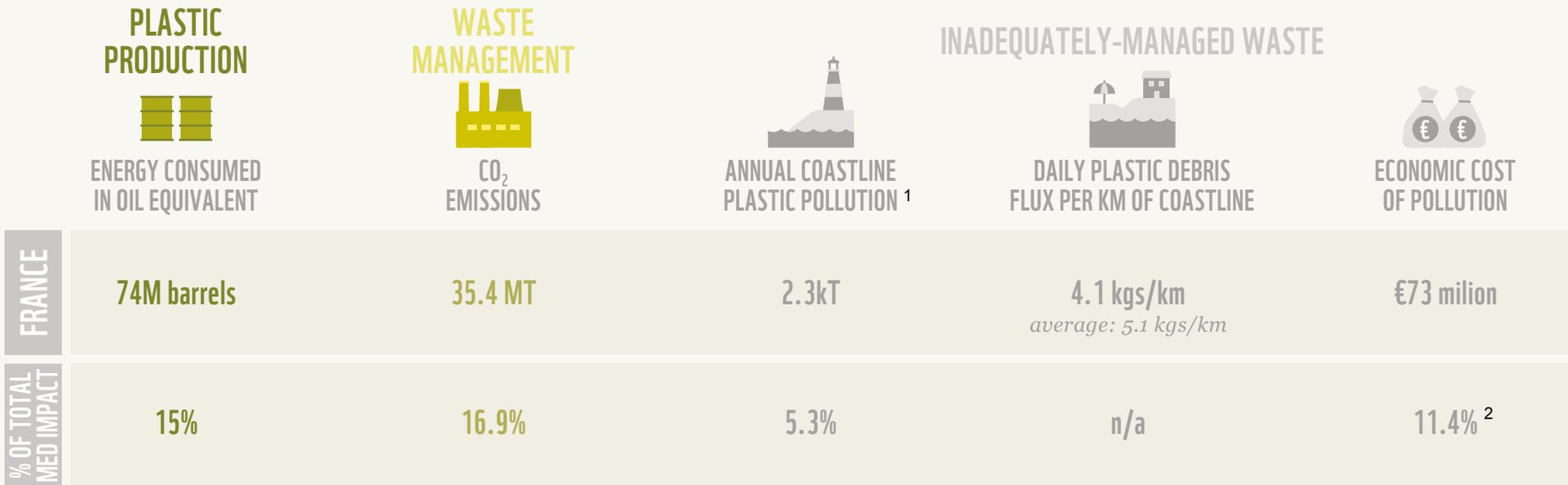
- France’s consumption requires the equivalent of 74M barrels of oil in energy, and emits 35.4 MT of CO₂
- Current plastic recycling levels help avert 637k tons of CO₂, and if increased, could help offset a larger proportion of these emissions.

Plastic debris accumulation along the coast of France is below the Mediterranean average given the natural north-east to

south-west sea current and drift, and its short exposed coastlines.

- Liubartseva et al, (2018) found lower concentration of floating plastic in French waters compared to surrounding countries. Hotspots exists, reaching up to 20g/m³, in densely populated and urbanized areas in the gulf of Marseille, Rhone River delta and the city of Nice.

PLASTIC IMPACT: FRANCE’S COASTLINE EXPERIENCES SOME OF THE WORST IMPACTS OF PLASTIC POLLUTION IN THE MEDITERRANEAN



¹ Total plastic debris ending up on the country’s coastlines each year, as showcased on the right -hand graph on slide 8.

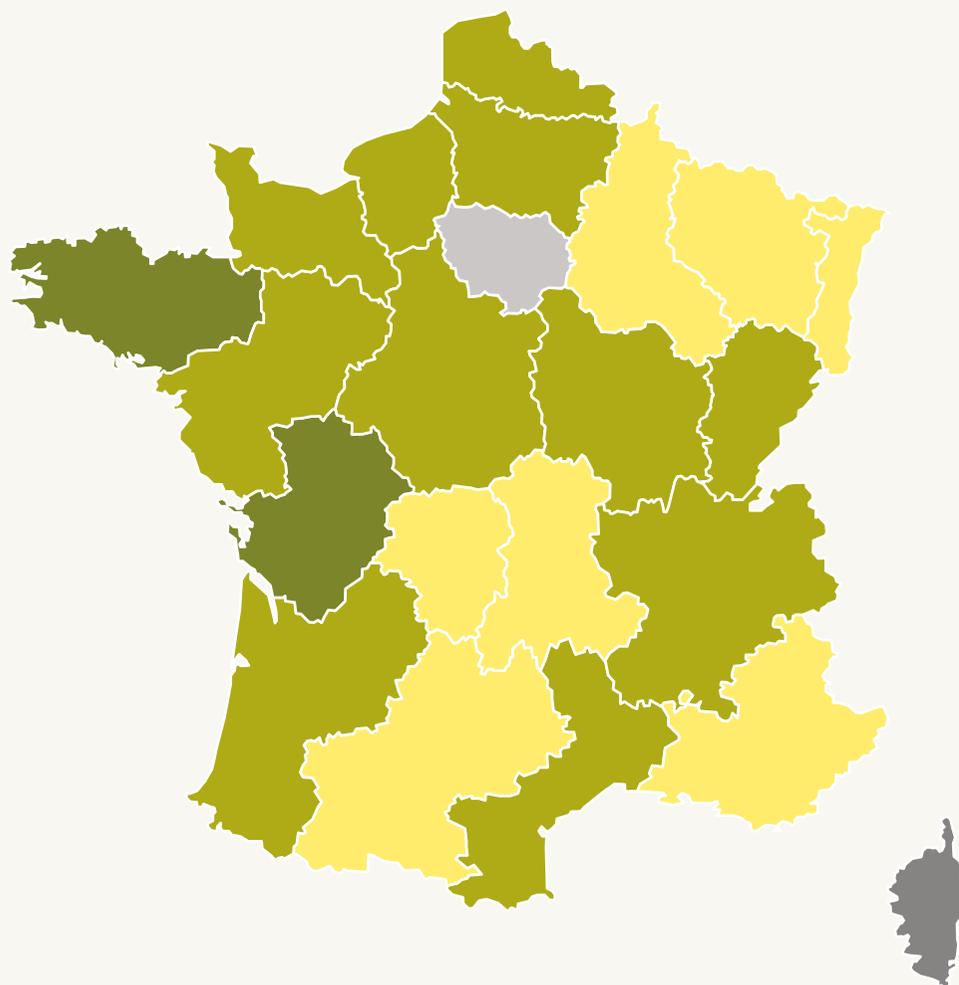
² Economic impact of plastic pollution on Tourism, Fisheries, and Maritime Trade. Total excludes the cost of clean-up

³ Calculated based on the total economic cost of pollution for all 22 Mediterranean countries

Sources: S. Liubartseva et al, 2018: "Tracking plastics in the Mediterranean: 2D Lagrangian model", IUCN Red List, Dalberg analysis.

FRANCE
RECYCLING DATA

WASTE COLLECTION IS MOST EFFECTIVE IN THE WEST WHILE RECYCLING CAPACITIES ON THE MEDITERRANEAN COAST & IN CORSICA ARE UNDER PRESSURE FROM TOURISM



Percentage of Municipal Solid Waste recycled (Eurostat 2011)

On the Mediterranean coast, waste management capacity is often insufficient to handle and recycle high waste volumes. In addition, existing infrastructure is under pressure from high seasonal variability due to the tourism industry :

- All departments along the coast are below average in terms of household waste recycling (36.5% in 2013). South Corsica (15%) and the Var (22%) have particularly low household waste recycling rates.
- A third of all waste across the Mediterranean coast ends up directly in landfill.
- Landfill is particularly high in some areas such as Marseille (40%) and Corsica (75%). These areas also have numerous open-air landfill due to saturated official landfills.

■ >50% recycled

■ >40% recycled

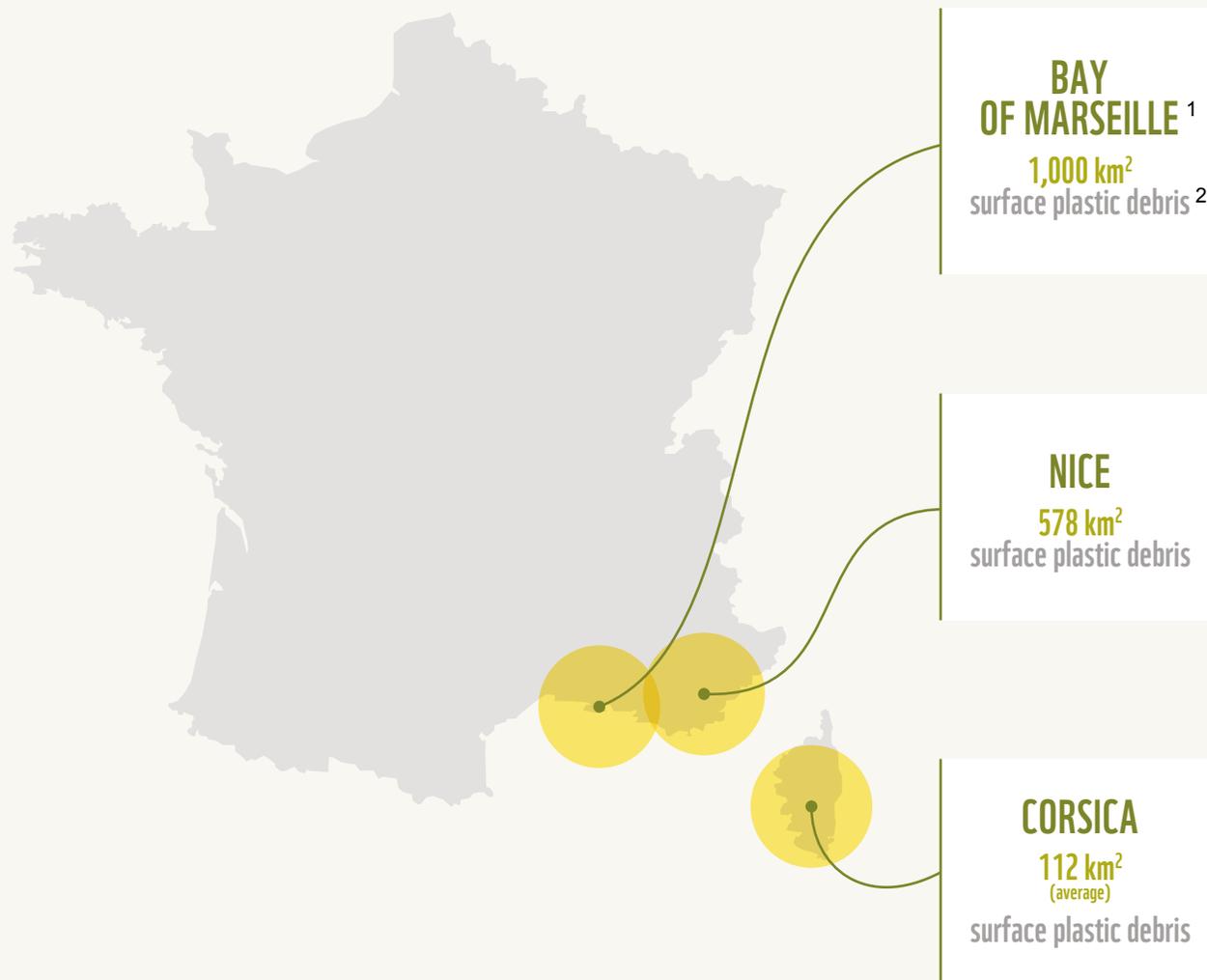
■ >30% recycled

■ >20% recycled

■ <20% recycled

POLLUTION ON MEDITERRANEAN COASTS

PLASTIC POLLUTION IS THE MOST SEVERE ALONG THE MEDITERRANEAN COAST



The concentration in surface plastic debris is very high along the Mediterranean coast, in particular near Marseille, Nice and Corsica. These high concentrations are due to coastal activities such as tourism and leisure maritime activities.

¹ The bay of Marseille is a pollution hotspot. The main sources of pollution are coastal activities from Marseille as seen in slide 8. River pollution is a minor pollution source and the Rhone River Delta is the main river feeding into the bay, located 70km's away from the city of Marseille.

² Surface count of debris in waters surrounding the hotspots, following Schmidt (2018) and Pedrotti (2016) methodology. Sources: Horizon 2020, 2014: Mediterranean Report, S. Liubartseva et al, 2018: "Tracking plastics in the Mediterranean: 2D Lagrangian model". Pedrotti, "Changes in the floating plastic pollution of the Mediterranean sea in relation to the distance to land", 2016, Schmidt, "Occurrence of microplastics in surface waters of the Gulf of Lion", 2018; Eurostat Municipal Waste data by region, 2011 data most recent data for France by region

PLASTIC ECONOMIC IMPACT

FRANCE'S "BLUE ECONOMY", LOSES OVER €73 MILLION ANNUALLY TO THE EFFECTS OF PLASTIC POLLUTION



TOURISM
ESTIMATED IMPACT:
€ 40 MILLION

- Plastic pollution might compromise tourist flow to particular marine areas, and threaten new private sector investment in hotel developments, etc. in these areas.
- The tourism industry often bear **the cost of clean up** to ensure locations remain attractive for tourists.
- Almost **120 million days of accommodation booked on the French littoral** during summer 2017, one third of tourist days in the country.



FISHERIES
ESTIMATED IMPACT:
€ 12 MILLION

- Marine pollution can **clog boat engines and fishing nets** leading to disruption of the fishing industry. The largest cost to the industry is related to **vehicle damage and additional maintenance caused by collision with plastic debris, and delays caused by fishing nets filling up with plastic** rather than fish.
- Marine plastic pollution reduces both the **supply of, and demand for, seafood** due to animal deaths and concerns that animals have ingested plastic.



MARITIME TRADE
ESTIMATED IMPACT:
€ 21 MILLION

- Transport is particularly vulnerable to collisions with plastic pollution, entanglement of floating objects with propeller blades and clogging of water intakes for engine cooling systems. Costs are incurred by **vessel downtime, delays and additional maintenance costs**.
- **Port facilities** are also at risk of damage from plastic pollution, including **clogging port waterways, creating delays incurring clean up costs**.



COST OF CLEAN-UP
ESTIMATED IMPACT:
€ 3 MILLION

- Shoreline cleaning range costing under €100 per ton collected by volunteer-led initiatives, to in excess of €18,000 per ton for dense waste and heavy fishing gears.
- McIlgorm et al. found that the **average shoreline clean-up cost estimate across studies has an average of US\$1500/ton (~€1300/ton)**.

■ ECONOMIC LOSS ■ POTENTIAL COST

THE IMPACT AND COSTS OF MARINE PLASTIC POLLUTION ARE NOT TYPICALLY BORNE BY THE POLLUTERS, BUT BY COASTAL COMMUNITIES, LOCAL MUNICIPALITIES AND DIRECTLY AFFECTED INDUSTRIES

¹ Cost to industry is calculated based on the methodology used in McIlgorm et al, 2011., taking the proxy of cost to the fishing and shipping industries from Takehama, 1990. Sources: Union for the Mediterranean: 'Blue Economy in the Mediterranean', WEF, 2017: 'Travel and Tourism Competitiveness Report', INSEE (2017) "Saison touristique d'été 2017"

CURRENT POLICIES REGARDING PLASTICS (MAY 2019)¹

POLICY LANDSCAPE: ITALY HAS IMPLEMENTED SOME PIONEERING POLICIES TO REDUCE PLASTIC USE AND COLLECT SORTED WASTE



EXISTING INITIATIVES	national level	<p>FREC²: announced tax incentivization towards recycled plastic, accounting for up to 10% of the retail price</p>	<p>Biodiversity 2016-1087: ban on plastic microbeads in cosmetics by 2018 and cotton bud by 2020</p>	<p>EGALIM 2018-938:</p> <ul style="list-style-type: none"> - Ban by 2020 of straws, cutlery, beverage stirrers, disposable glasses, steak sticks, ice pots, meal trays, salad bowls, plastic boxes, and disposable drinks lids - Ban by 2020 of use of plastic bottles in public collective catering - Ban by 2025 of heating and service containers in plastics in public collective catering 	<p>LTECV 2015-992, reinforced by 2018-1317 : objective to half use of landfills for non construction waste by 2025 through phased tax increase</p> <p>Result: first tax increase in 2016, decreasing number of landfills</p>	<p>15/02/2016 Decree on non-hazardous waste storage facilities: Strong landfill regulation and norms</p>
	local level		<p>LTECV 2015-992: Ban on single use items (exceptions for compostable and bio sourced plastics):</p> <ul style="list-style-type: none"> - Oxo-fragmentable plastics for packaging and bags by 2015 - Plastic bags under 50 micron by 2016 - Plastic packaging of mail advertising by 2017 - Plastic disposable kitchen cups, glasses and plates by 2020 		<p>LTECV 2015-992: reinforcement of existing EPR systems such as CITEO (e.g. bonus-malus system based on recycling performances) and creation of new channels of recycling</p>	<p>FREC²: announced goal of 100% plastic recycling by 2025, up from 22% in 2016, through a reduction of VAT on recycling activities and the creation of plastic disposal mechanism</p>
		<p>Grenelle I & II (2009-2010): Aiming to reduce per capita household waste through local prevention program</p>		<p>NOTRe 2015-991: Strengthened role of regional and communal action plans (PRPGD) implementing legislation, including waste reduction and management</p> <p>Result: large variation in efficiency from 12 to 54% of waste recycling</p>		

■ industry
 ■ policy-makers
 ■ consumers
 ⋮ announced/to be implemented

¹ Legislation in France is currently evolving and may change over the course of 2019
² FREC : announcements made as part of the 'Roadmap for a Circular Economy' letter of intent and subsequent announcements by governments officials
 Sources: Dalberg analysis, European Parliamentary Research Service(2018) "Towards a circular economy – Waste management in the EU", ADEME (2017) "Key figures", Le Figaro (2019) "Vers un bonus malus pour encourager le recyclage" (link), LegiFrance

FRANCE
POLICY ROADMAP

POLICY LANDSCAPE: FRANCE SHOULD LOOK TO BEST PRACTICES ACROSS THE VALUE CHAIN, INVOLVING DIFFERENT TYPE OF ACTORS



PLASTIC PRODUCTION: Focus on upstream actions to reduce plastic production, develop alternatives, and ensure the effective design of products

PLASTIC USAGE: Go beyond EU requirements in existing plastic bans to reduce consumption and develop the deposit refund scheme

WASTE MANAGEMENT: Build and implement a detailed roadmap to 100% recycled plastic by 2025 by developing EPR and engaging with businesses

MISMANAGED WASTE: Support municipalities who struggle with waste collection capacity and increase accountability against illegal waste dumping

EXAMPLE BEST PRACTICE INITIATIVES

national level

municipal level

Consider introducing an Eco-Tax on virgin plastic production, ensuring industries report on production quantities, in coordination with EU standards

Develop requirements for minimum recycled plastic content, going beyond EU targets (e.g. 30% recycled plastic in all beverage bottles by 2030)

Include non-virgin plastic material in public procurement requirements to stimulate a market for secondary materials and incentivize the use of alternative materials

Provide support at a local scale to SME's, building on programs such as ADEME's "TPE & PME gagnantes sur tous les coûts"

Extend existing single-use item bans and restrictions to go beyond EU targets, and provide a roadmap of actions and targets by 2025

- Extend existing bans (e.g. extended microbeads ban adopted by New Zealand)
- Further limit exceptions made for biodegradable or bio sourced plastics

Consider an integrated deposit-refund scheme on all packaging,

- Including packaging beyond beverage bottles incentivise waste sorting
- Targeting increase reusing of packages over recycling

Develop eco-design requirements on the recyclability of plastic packaging (e.g. avoiding non recyclable additives, etc.)

Provide support and funding to local awareness raising initiatives on plastic use

Develop and extend existing ERP channels beyond European targets, e.g. by setting explicit collection and recycling target rates for existing household waste ERP schemes

Clarify and streamline indicators and criteria's used to evaluate recyclability of plastics items by setting up an independent authority, for instance building on the ADEME expertise to deliver operational recommendations and incentive mechanisms

Build a plan towards total landfill ban for recyclable waste, building on EU directives on landfill use (e.g. 18/98 directive), and existing legislation in other Eu countries (Denmark 1997 landfill ban)

Tailored plans for municipalities in need of support to improve cost-effective collection, sorting, and treatment, and create localised targets for accountability

Develop **seasonal waste management plans** for islands and coastline with particularly high tourist influx

Use technology to identify illegal dumping sites (e.g. trough satellite imagery) and support municipalities in applying penalties polluters. Work to rehabilitate the sites to minimize environmental damage

Ensure conformity of existing landfills and create accountability mechanisms, focusing on areas with aging or substandard systems, (e.g. substandard landfills in region PACA)

Incentivize local **fishing industries** to carry plastic waste that was caught in nets to shore for disposal



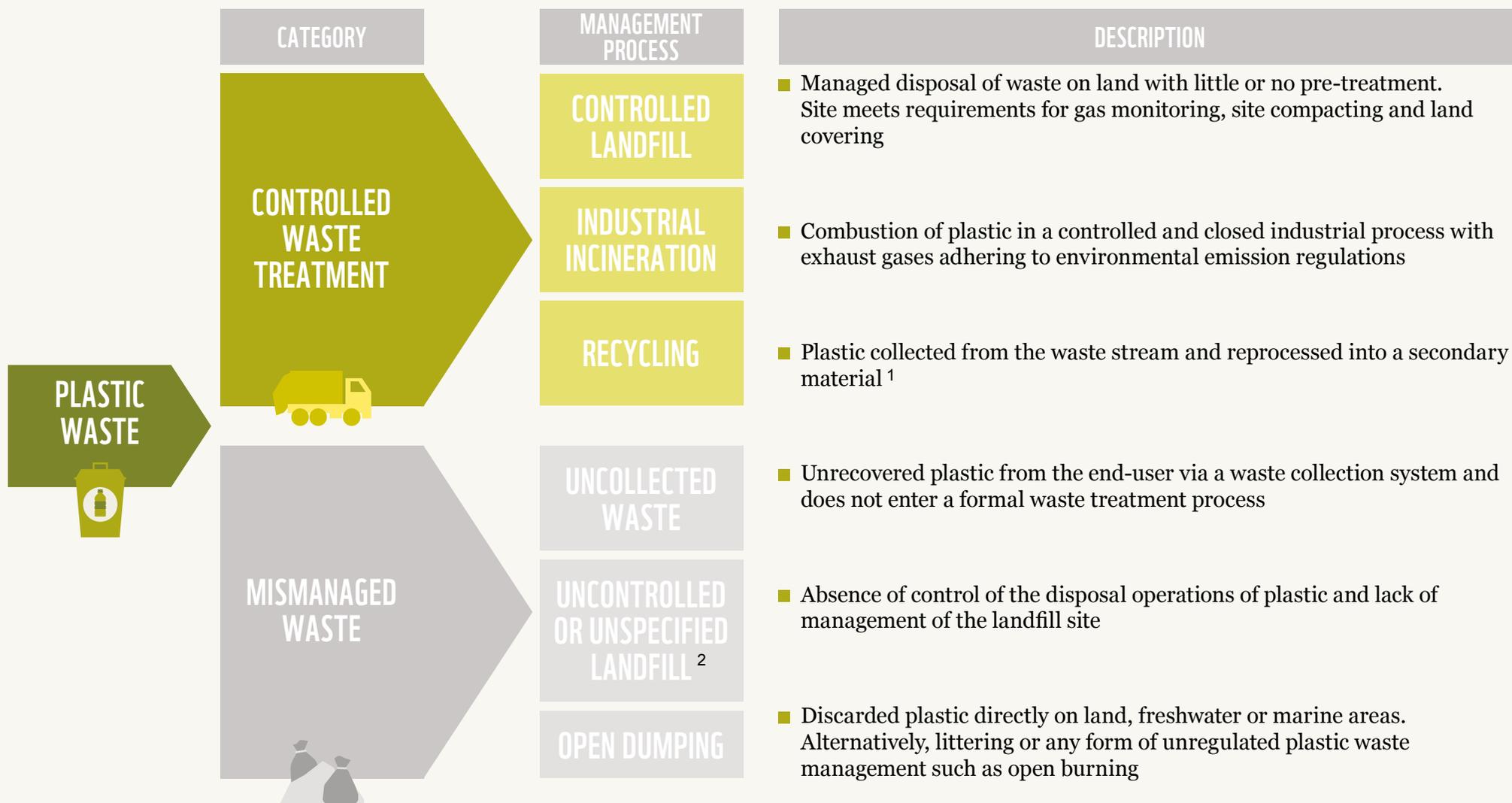
Sources: Dalberg analysis, Dreal PACA (2016) "Serie de contrôles Novembre 2016", LegiFrance., The Case for Taxing plastics, UN Environment (2018) : "Legal Limits on Single-Use Plastics and Microplastics"

PRIORITY ACTIONS – POLICY LANDSCAPING ANALYSIS

FRANCE SHOULD PRIORITIZE WASTE REDUCTION, INCENTIVIZATION OF PRODUCT REUSE, AND RECYCLABILITY OF PLASTICS

FOCUS AREA	POTENTIAL IMPACT	FEASIBILITY AND TIMEFRAME	PRIORITY ACTIONS
<p>1. FURTHER REDUCE CONSUMPTION OF PROBLEMATIC PLASTIC</p> <ul style="list-style-type: none"> Go beyond EU minimums and implement new plastic bans Build a clear roadmap and set of objectives for bans for 2025 	<ul style="list-style-type: none"> Acting upstream by reducing plastic use and waste generation is a high impact strategy according to the WFD hierarchy Enable France to be a front runner in the EU on the issue of plastic waste reduction Strong citizen involvement potential in more sustainable purchasing choices <p><i>High impact on plastic in nature</i></p>	<ul style="list-style-type: none"> Feasibility: easily achievable France has a good track record of achieving EU targets on single use bans, but going beyond existing standards will require political will Timeframe: short to medium In cases where viable alternatives to single use items are available the switch can be operated swiftly <p><i>Low difficulty to implement</i></p>	<ul style="list-style-type: none"> End exceptions made for biodegradable or bio sourced plastics, aligned with EU directives Extend bans to new sectors and types of single use plastic goods (small water bottles, microbeads, takeaways food sector ...) Establish industry partners willing to set standards before legal bans and define best practices in alternative development (e.g. unpackaged product)
<p>2. ENSURE BETTER DURABILITY AND DVP. OF REUSABLE PRODUCTS:</p> <ul style="list-style-type: none"> Consider an integrated deposit-refund scheme on all packaging, providing the infrastructure for viable alternatives to plastics Incentivize consumers and producers to take action on reusable packaging 	<ul style="list-style-type: none"> Acting upstream by reducing plastic waste generation is a high impact strategy according to the WFD hierarchy New economic opportunities arising from the streamlining and repurposing of materials <p><i>Medium impact on plastic in nature</i></p>	<ul style="list-style-type: none"> Feasibility: achievable Demonstrated track record of bottle deposit-refund schemes enables efficient implementation provided funding Timeframe: short to medium First steps can be achieved swiftly but a nation-wide integrated system for all household packaging will require continued efforts over the medium term <p><i>Medium difficulty to implement</i></p>	<ul style="list-style-type: none"> Develop a plastic deposit-refund scheme for selected packaging Develop alternative deposit-refund scheme on packaging, focusing on reusing over recycling, and including alternative to plastic Develop a clear national framework of label on durability of plastic products
<p>3. INCENTIVIZE PLASTIC RECYCLING THROUGH EXPANDED ERP</p> <ul style="list-style-type: none"> Achieve 100% plastic waste recycled by 2025 Further ensure all producers pay a fair contributions for waste management and integrate recycling into the design of products Expand recycling to other types of plastic and ensure recyclability of plastic items produced 2025 	<ul style="list-style-type: none"> Redistribute cost of recycling and ensure producers bear some the cost of pollution Economic opportunities for the recycling industry and the modernization of French capabilities <p><i>Medium impact on plastic in nature</i></p>	<ul style="list-style-type: none"> Feasibility: medium Media pressure is growing on industries to claim responsibility for plastic waste Timeframe: medium Additional recycling capacity, will require long-term investment, but France's historical recycling growth is promising <p><i>Medium difficulty to implement</i></p>	<ul style="list-style-type: none"> Develop eco-design requirements on the recyclability of plastic packaging (e.g. less additives, less multilayer packages) Highlight best practices of ERP from countries or industry 'top performers' and develop new ERP streams Create an independent authority on eco-contribution, for instance through ADEME, whose recommendation should eventually be implemented by Citeo. Include municipalities in need of support to find tailored solutions to waste management

ANNEX I – PLASTIC WASTE SYSTEM ACTIVITIES CAUSING CONTROLLED AND MISMANAGED WASTE



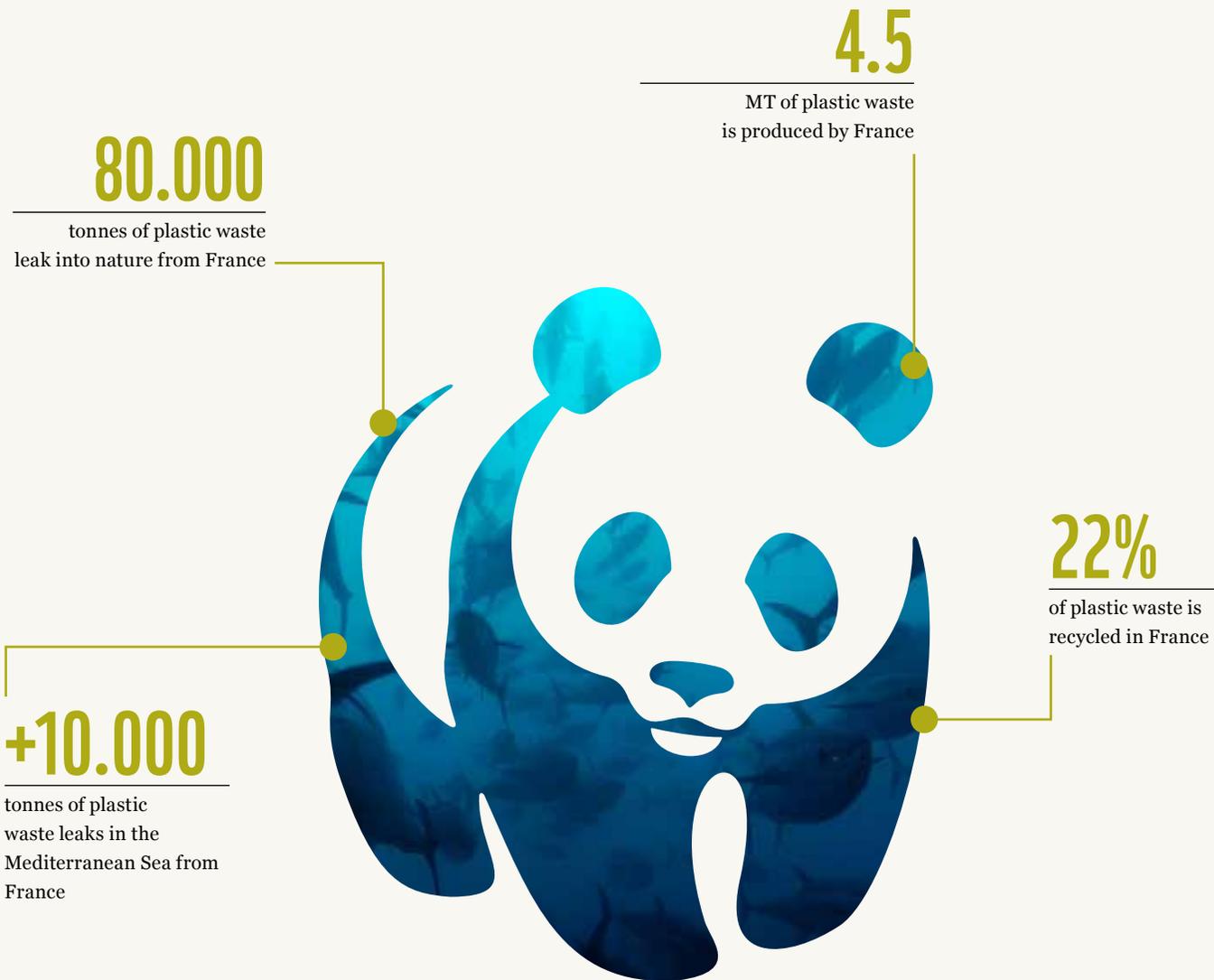
¹ Not accounting for plastic losses during the recovery process
² Unless explicitly specified as “controlled” or “sanitary” landfills, we consider all other landfills as uncontrolled.
 Source: Dalberg analysis, Jambeck & al (2015), World Bank (2018), SITRA (2018), European Commission (2001)

ANNEX II – GLOSSARY OF TERMS

ACRONYMS		TERMS	
■ CO ₂	Carbon dioxide	■ Controlled landfill	A landfilling process which is subject to a permit system and to technical control procedures in compliance with the national legislation in force.
■ EU	European Union	■ Uncontrolled landfill	A landfilling process which fails to meet certain standards and technical control procedures, and therefore is at risk of leakage or contamination.
■ EPR	Extended Producer Responsibility Schemes	■ Open dump	Illegal land disposal sites at which solid wastes are disposed of in a manner that does not protect the environment, and are therefore susceptible to leakage, open burning, and are exposed to the elements, vectors, and scavengers.
■ MSW	Municipal Solid Waste	■ Controlled waste treatment	All legally compliant waste treatment operations, including controlled landfilling, waste-to-energy (incineration) and recycling.
■ MT	Megaton (Million Tonnes)	■ Recycling	All plastic collected for recycling from the waste stream. This figure is not adjusted for actual material losses during reprocessing into a secondary material. These material losses result from collected plastic considered as not recyclable due to additives preventing recycling or food contamination, etc
■ PET	Polyethylene Terephthalate	■ Secondary material production	The total amount of secondary plastic product extracted from the plastic recycling process, averaging at 55% of the material inputted for recycling.
		■ Mismanaged waste	All plastic left uncollected, openly dumped into nature, littered, or managed through uncontrolled landfills.
		■ Recovered mismanaged waste	Mismanaged waste that re-enters the controlled waste management process through waste-pickers, clean up operations, or any other method.
		■ Packaging Plastics	Plastic items used to transport, store, preserve or protect products. These include recyclable resins such as PET, HDPE, LDPE (partially) and PP (partially), and non-recyclable resins PCV and PS. Increasingly, these also include some bio-degradable or compostable plastics, which are treated in separate organic waste streams.
		■ Bio-degradable	A product that can be broken down by microorganisms (bacteria or fungi) into water, naturally occurring gases like carbon dioxide (CO ₂) and methane (CH ₄) and biomass.
		■ Blue Economy	Represents all economic activities related to oceans, seas or coastal areas. It covers established sectors such as fisheries, shipbuilding and tourism as well as emerging industries, including ocean energy and biotechnology.

ANNEX III – METHODOLOGY FOR THE CALCULATION OF EACH DATA METRIC IN THIS GUIDEBOOK

SECTION	METRIC	METHODOLOGY
PLASTIC LIFECYCLE (MT)	■ Plastic Goods Produced	Collected national-level data on total production of PP, PET, HDPE, LDPE, PCV and PS. Plastics are used in many products that are imported and exported and limited public data exists separating these goods into their the raw materials used. This plastic goods production data by country is not adjusted for international trade (import and export) of these products. If national plastic goods data unavailable, calculated based on the ratio of global plastic production to plastic waste for 2016 in the WWF global plastics report (78%).
	■ Waste Generation and Management	Collected national-level data on total plastic waste generation per annum, or total waste MSW waste generation and percent composition of plastic within MSW. Also collect national-level data on plastic management (percentages of plastic waste collected landfilled, incinerated, recycled or openly dumped). Data validated with relevant WWF national offices.
	■ Mismanaged waste	Calculated by adding the total waste which goes uncollected, openly dumped and sent to uncontrolled landfills. Data on uncollected waste is taken from the World Bank ‘What a Waste 2.0’ Database.
	■ Waste recovered or leaked into nature	Calculated using the proxy of 90% of mismanaged waste ending up in nature, based on the study completed by Jenna Jambeck Research Group, 2015. We assume the rest of the waste is recovered through clean-up operations, etc.
	■ Waste leaked into the Mediterranean	- For countries whose coastline are only on the Mediterranean, this figure is calculated based on the proxy that 10% of plastic waste becomes marine litter, as found in the analysis completed by Jenna Jambeck Research Group, 2015. - For countries with multiple coastlines, this figure also takes into consideration the proportion of waste generated by regions with coastlines on the Mediterranean.
	■ Waste leaked by source (sea-based, rivers, coastal)	Collected data on sea-based sources and major rivers from S. Liubartsevaa et al, 2018. Where data is missing for other major rivers, annual plastic flux is calculated as a ratio between the Po River’s drainage basin, and its annual plastic flux. Coas tal sources represent the remainder of annual leakage.
PLASTIC IMPACT	■ Energy consumed in oil equivalent (M, barrels)	Calculated based on the weighted average of energy required to make a kilogram of global plastic (PP, PET, HDPE, PS, PCV), converted into barrel of oil equivalent.
	■ Average age of plastic life (years)	Calculated based on national data collected on the production of plastic per industry, and the average lifetime of plastic goods in each industry, as found in peer-reviewed research completed by Roland Geyer et al, “Production, Use, and Fate of All Plastics Ever Made”, 2017
	■ CO ₂ emissions (MT)	Calculated based on the average CO ₂ emissions caused by plastic production, incineration and recycling, as reported by SITRA, 2018: “The Circular Economy a Powerful Force for Climate Mitigation“.
	■ Annual coastline plastic pollution (kT)	Calculated based on the daily plastic debris flux (kg/km) multiplied by the total length of the coastline and 365 days. This differs from the total plastic leaked into nature as it doesn’t include plastic on the sea -bed and sea-surface.
	■ Daily plastic flux (kg/km)	Collected data from S. Liubartsevaa et al, 2018: “Tracking plastics in the Mediterranean: 2D Lagrangian model”.
	■ Economic cost of pollution (M, €)	Calculated based on the methodology used in McIlgorm et al, 2011 to estimate the cost of plastic pollution to the APAC region, which takes the proxy of cost to the fishing and shipping industries from Takehama, 1990.
REGION	■ Cost of waste generated by tourists (M, €)	Calculated based on the proportion of waste generation caused by tourists, which was calculated based on national statistics on tourist arrivals and departures. The cost uses the World Bank estimated cost of \$50-100/T of waste in an advanced system.
	■ Included countries	ALB, BIH, CYP, DZA, EGY, ESP, FRA, GIB, GRC, HRV, ISR, ITA, LBN, LBY, MAR, MCO, MLT, MNE, SVN, SYR, TUN, TUR (22)



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To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature.

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