



Ca' Foscari  
University  
of Venice

## Master's Degree Programme

Second Cycle  
(ex. D.M. 270/2004)

in  
Comparative International Relations

Final Thesis

Is environmental legislation profitable for  
businesses?

*Circular Economy and Closed-Loop Supply Chains  
in Europe and in the United States*

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**Academic Year**

2017/ 2018

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## RINGRAZIAMENTI

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Questo lavoro si è sviluppato grazie al dialogo con docenti e professionisti che hanno condiviso con me il loro tempo e le loro competenze, ciascuno nel proprio campo di conoscenza, contribuendo a darmi una visione complessiva su un tema ampio e interdisciplinare come quello oggetto di questa tesi.

Ringrazio la mia relatrice, la Professoressa Sara De Vido per aver creduto nel mio progetto e per l'incoraggiamento e la guida che mi ha dato in questi mesi; un ringraziamento va al correlatore, il Professor Robert Swinney per avermi accolta alla Fuqua School of Business della Duke University durante il mio periodo di ricerca negli Stati Uniti e per i suggerimenti che mi ha dato prima, durante e dopo il mio soggiorno.

Ringrazio il Professor Marco Mazzarino per avermi introdotta al tema della 'Reverse Logistics' dandomi i primi spunti di riflessione su questo progetto e al Professor Atalay Atasu per i consigli '*sul campo*' e per aver condiviso con me le sue conoscenze. Ringrazio la Venice International University per avermi offerto la possibilità di fare ricerca alla Duke University e lo staff di Duke per avermi affiancata prima e durante la mia permanenza negli Stati Uniti.

Un grazie va al Dottor David Denti di Ecopneus e al manager di LightRecycle Washington per aver dialogato con me, rispondendo alle mie domande e fornendomi nuovi spunti di riflessione.

Un ringraziamento particolare è dovuto alle persone che mi hanno supportato (e sopportato) durante questo percorso di laurea magistrale: ai miei genitori, a mio fratello Nico e a mio zio Vincenzo che mi è stato vicino durante il mio periodo di ricerca negli Stati Uniti.

Grazie a Mirko, che mi ha sostenuta in questi mesi con la sua fiducia incondizionata in me e con il suo Amore.

Un ringraziamento di cuore va alle mie compagne di studio e amiche Anna, Marta ed Elisa, che hanno contribuito a rendere il mio periodo 'veneziano' uno dei più belli della mia vita.

## ABSTRACT

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Questo lavoro intende rispondere alla questione se vincoli di tipo legislativo finalizzati a ridurre l'impatto delle imprese sull'Ambiente possano dimostrarsi uno stimolo nei confronti delle stesse a migliorare la propria redditività, attraverso l'adozione di modelli di business che oltre ad essere sostenibili da un punto di vista ambientale, nel lungo periodo possano dare beneficio anche ai bilanci aziendali.

Per poter rispondere a questa domanda si è analizzata una specifica situazione che ha ripercussioni sia sull'organizzazione delle aziende che su temi di diritto ambientale: la Responsabilità Estesa del Produttore (in inglese - Extended Producer Responsibility, EPR). La Responsabilità Estesa del Produttore viene esercitata dagli Stati nei confronti delle imprese che hanno l'obbligo sia finanziario che tecnico della gestione dei propri prodotti una volta giunti al loro fine vita e considerati quindi come rifiuti. Il fine di questa legislazione è far sì che le imprese siano responsabili del loro impatto nei confronti dell'Ambiente e che questa non ricada sulla collettività.

Le imprese d'altro canto, possono organizzare la propria catena di distribuzione (in inglese: supply chain) secondo la logica della logistica di ritorno (in inglese: reverse logistics) che 'chiude il cerchio' della logistica tradizionale che contempla il ciclo di vita del prodotto dalla sua ideazione fino all'assemblaggio finale e messa sul mercato, 'ribaltando' di fatto questo processo, ossia partendo dal prodotto a fine vita o in stato di rifiuto, in seguito si procede alla selezione delle componenti e/o dei materiali presenti nel prodotto che hanno ancora un' utilità per re-immetterle nel processo produttivo dell'impresa o per essere vendute. È evidente che questo tipo di gestione permette alle imprese da un lato di ridurre i propri costi di approvvigionamento delle materie prime e dall'altro di rispettare i vincoli ambientali imposti dai vari legislatori nazionali.

Questi temi sono stati ampiamente descritti all'interno del lavoro, che è diviso in due macro-capitoli: il primo capitolo è dedicato alla legislazione sulla Responsabilità Estesa del Produttore ed il secondo tratta il tema delle 'catene di distribuzione a ciclo chiuso' (in inglese: closed-loop supply chains - CLSCs). Un terzo capitolo comprenderà casi aziendali.

Nello specifico, il primo capitolo analizzerà da quali principi di diritto internazionale ha origine la 'Responsabilità Estesa del Produttore' e si vedrà che quelli cardine sono il Principio dello Sviluppo Sostenibile e il Principio 'Chi inquina paga'. Si fornirà un excursus storico e dei contenuti di questi principi stabiliti nel corso di accordi internazionali.

In seguito, si analizzerà l'applicazione della legislazione sulla 'Responsabilità Estesa del Produttore' in due contesti differenti: gli Stati Uniti d'America e l'Unione Europea.

Negli Stati Uniti la legislazione sulla 'Responsabilità Estesa del Produttore' è una competenza prevalentemente affidata ai singoli stati, nonostante la presenza di alcune normative quadro a livello federale; inoltre le leggi statunitensi tendono a regolare specifici prodotti piuttosto che categorie merceologiche più ampie. Pertanto, vi è una certa eterogeneità all'interno del territorio statunitense, sia in termini di requisiti normativi che di 'performance'. Generalmente gli stati della costa occidentale (California, Nevada, Oregon) e Washington sono associati a migliori risultati per quanto riguarda il riciclaggio e in termini di sensibilità rispetto ai temi ambientali. Verranno quindi descritte le normative a livello federale che a livello dei singoli stati, evidenziando il rapporto che sussiste tra di esse. In particolar modo verranno descritte le leggi statali per i seguenti prodotti: batterie, termostati a mercurio, sensori delle auto, prodotti elettronici, pittura, prodotti chimici, mercurio, medicinali e tappezzeria.

La 'Responsabilità Estesa del Produttore' nell'Unione Europea verrà studiata alla luce delle Direttive del cosiddetto 'Pacchetto sulla Circular Economy'.

Per poter analizzare le Direttive è necessario comprendere come si è sviluppato il diritto ambientale europeo e su quali principi poggia. Si approfondiranno il Principio dello Sviluppo Sostenibile e il Principio ‘Chi inquina paga’. Verranno trattati i principi di carattere ambientale delineati dall’articolo 191(2) del Trattato sul Funzionamento dell’Unione Europea (TFUE), ossia i principi della precauzione e dell’azione preventiva, il principio della correzione, in via prioritaria alla fonte, dei danni causati all’ambiente, e il principio ‘chi inquina paga’.

La normativa ambientale dell’Unione Europea ‘abbraccia’ due obiettivi fondamentali per l’Unione: la protezione dell’ambiente garantita dall’ Articolo 192 TFUE ed il conseguimento del mercato interno enunciato dall’ Articolo 114 TFUE. Tali articoli fungono da base legale per la normativa di carattere ambientale e la scelta tra uno o l’altro viene fatta in base all’obiettivo preponderante, secondo la teoria del ‘centro di gravità’. Quanto detto si applica anche alle direttive del Pacchetto sull’Economia Circolare.

Il Pacchetto sull’Economia Circolare, approvato nel 2018 è il risultato di una politica europea sui rifiuti che si è sviluppata a partire dalla Direttiva sui Rifiuti del 1975, considerata la Direttiva Madre di una serie di altre direttive e documenti. La Direttiva del 1975 è stata in seguito emendata nel 2006 ed incorporata dall’attuale Direttiva Quadro sui Rifiuti del 2008, che è stata emendata nel 2018. I connotati principali della Direttiva sono la definizione di rifiuto, il concetto di sottoprodotto e sulla cessazione della qualifica di rifiuto e la gerarchia dei rifiuti. La gerarchia dei rifiuti fissa le modalità di gestione dei rifiuti; la scelta ottimale ricade sulla *“prevenzione dei rifiuti, seguito dalla preparazione al riutilizzo, riciclaggio, recupero di altro tipo, per esempio il recupero di energia e smaltimento”*<sup>1</sup>. Tale gerarchia è finalizzata alla prevenzione in vista del recupero di materie prime secondarie, necessarie a sostenere la domanda dell’industria europea a fronte della riduzione di materie prime in natura; dall’altro lato il suo scopo è quello di ridurre l’impatto e lo sfruttamento dell’Ambiente.



Il Pacchetto sull'Economia Circolare è stato promosso dalla Commissione Europea al fine di sostenere la competitività dell'industria europea sui mercati globali e di proteggere l'Ambiente. Nel 2014 è stato negoziato il Primo Pacchetto sull'Economia Circolare combinato dalla Comunicazione della Commissione Europea 'Verso un'economia circolare: programma per un'Europa a zero rifiuti', ritirata nel febbraio 2015 perché non considerata in linea con gli obiettivi di crescita e occupazione dell'Agenda Juncker. Nel dicembre 2015 la Commissione ha preparato un nuovo Pacchetto sulla Circular Economy formato da un Piano d'Azione e da una serie di proposte volte ad emendare le Direttive 2008/98/CE sui rifiuti la Direttiva 2000/53/CE relativa ai veicoli fuori uso, la Direttiva 2006/66/CE relativa a pile e accumulatori e ai rifiuti di pile e accumulatori, la Direttiva 2012/19/UE sui rifiuti di apparecchiature elettriche ed elettroniche (RAEE), la Direttiva 1999/31/CE sulle discariche di rifiuti e la Direttiva 94/62/CE sugli imballaggi e i rifiuti di imballaggio.

Il piano di azione, composto da 54 misure, ha come obiettivo *'chiudere il cerchio'* e segna la strategia della Commissione; il piano integra il contenuto delle proposte legislative. Le proposte del 2015 sono state sottoposte nei seguenti due anni alla procedura sull'adozione delle Direttive e nel giugno 2017 gli emendamenti sono stati approvati dal Consiglio Europeo. Il Trilogo infine è giunto a un accordo nel Dicembre 2017; infine il 14 giugno 2018 il Pacchetto sulla Economia Circolare è stato ratificato e diventato legge il seguente 4 luglio. È formato dalla Direttiva 2018/851/UE che emenda la Direttiva 2008/98/CE sui rifiuti; dalla Direttiva 2018/849/UE emendante la Direttiva 2000/53/CE relativa ai veicoli fuori uso, la Direttiva 2006/66/CE relativa a pile e accumulatori e ai rifiuti di pile e accumulatori, la Direttiva 2012/19/UE sui rifiuti di apparecchiature elettriche ed elettroniche (RAEE); dalla Direttiva 2018/850/UE che emenda la Direttiva 1999/31/CE sulle discariche di rifiuti e dalla Direttiva 2018/852/UE che emenda la Direttiva 94/62/CE sugli imballaggi e i rifiuti di imballaggio.

Ai fini di questo lavoro si analizzeranno le Direttive 2018/849/UE e 2018/851/UE.

In seguito, si analizzeranno le lacune del Pacchetto così come evidenziate da soggetti accademici e appartenenti al settore industriale e gli strumenti offerti dalla Commissione Europea e dalla Banca Europea degli Investimenti al fine di promuovere la diffusione dell'Economia Circolare.

Il secondo capitolo verterà sulla descrizione delle catene di distribuzione a circuito chiuso, un modello di logistica sostenibile in linea con gli enunciati dell'Economia Circolare.

La struttura di queste catene di distribuzione è influenzata da diverse variabili, come i prodotti immessi sul mercato, il livello di complessità della tecnologia, ma anche dalla scelta se internalizzare o esternalizzare la logistica di ritorno. Questi aspetti verranno descritti lungo il capitolo e verranno approfonditi i modelli di business da applicare ai diversi contesti.

Verranno evidenziate questioni strettamente strategiche per le imprese che intendono utilizzare le catene di distribuzione a circuito chiuso e temi di 'green marketing', per poter promuovere sul mercato prodotti provenienti da catene 'sostenibili'.

Infine, si analizzerà l'applicazione delle leggi sulla 'Responsabilità Estesa del Produttore', osservandole dal 'punto di vista' aziendale. In particolar modo si descriverà il ruolo delle imprese all'interno del dibattito politico e di come queste possano influenzarlo.

Il terzo capitolo unirà i risultati dei precedenti ed è dedicato alla descrizione di due realtà aziendali che sono state create a seguito dell'introduzione di leggi sulla 'Responsabilità Estesa del Produttore' nei propri contesti d'origine, l'Unione Europea e gli Stati Uniti d'America. Il primo caso di studio, è quello di Ecopneus, una società italiana fondata dai maggiori produttori e rivenditori di pneumatici in Italia a seguito dell'introduzione dell'Articolo 228 del Decreto Legislativo 152/2006 che impone ai produttori e importatori di pneumatici la loro corretta gestione.

Il secondo caso è quello di LightRecycle Washington, un programma della PCA Product Stewardship INC. lanciato a seguito dell'introduzione da parte della legge dello Stato di Washington dell'obbligo alla corretta disposizione delle lampadine a mercurio. LightRecycle Washington offre ai consumatori la possibilità di poter conferire le proprie lampadine a mercurio esaurite in un punto di raccolta, dal quale verranno poi inviate a un soggetto regolato dall'Agenzia Americana per l'Ambiente (EPA) per il riciclaggio.

Per entrambi i casi si sono descritti i modelli di business, ricavati dal sito web delle imprese e dal colloquio con i rispettivi manager. Entrambi i casi hanno sottolineato come una esigenza di carattere normativo, volta alla protezione dell'ambiente, abbia fornito alle imprese una nuova opportunità di business e pertanto confermato la domanda di partenza della tesi, ossia se la normativa ambientale possa essere uno stimolo per le imprese a migliorare la propria redditività e i propri risultati ambientali e dimostrando che le aziende che 'sanno vedere oltre' l'imposizione legislativa, possono diventare sostenibili sia da un punto di vista economico che ambientale.

## LIST OF ABBREVIATIONS

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CE	Circular Economy
CRMs	Critical Raw Materials
EC	European Commission
EEEs	Electrical and Electronic Equipment
ELVs	End of Life Vehicles
EPR	Extended Producer Responsibility
GATT	General Agreement on Tariffs and Trade
HPV	High production volume (chemicals)
PPP	Polluter Pays Principle
TEU	Treaty on European Union
TFEU	Treaty on the Functioning on European Union
TSCA	Toxic Substances Control Act
UNGA	United Nations General Assembly
US EPA	United States Environmental Protection Agency
WEEE	Waste Electrical and Electronic Equipment
WFD	Waste Framework Directive
WTO	World Trade Organization

## INTRODUCTION

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The aim of this thesis is to demonstrate that the protection of the environment pursued through legal provisions is not just a mere constraint for the daily activity of firms but can prove to be a source of economic sustainability, at least in the long term.

I am going to prove that by studying the principle of Extended Producer Responsibility (EPR), defined by the OECD as “*policy approach under which producers are given a significant responsibility – financial and/or physical – for the treatment or disposal of post-consumer products*”<sup>1</sup>. This is therefore, a legal principle which has implications on businesses enterprises, in particular with regard to waste management. I will argue that waste is not just the outcome of productive processes and regarded as a burden, rather it is a precious resource; this proves to be true nowadays, when the natural stock of raw material is depleting. This assumption resembles the notion of recycling; this is partially the case, however the idea is that materials flowing into the economic system are not used and discarded once the product has reached its end-of-life/end-of-use, but rather they flow in the industrial system up to the point in which the current technologies cannot exploit them anymore. This model has been defined as ‘*circular economy*’ in contrast to the ‘*linear economy*’ based on the “*take, make, dispose*”<sup>2</sup> paradigm. This dissertation, however will not treat the ‘*Circular Economy*’<sup>3</sup> as such but reference to the theme will occur throughout my research.

My work will study the notion of Extended Producer Responsibility both from a legal perspective and according to business-related literature and practice, studying a specific application, ‘*Closed-Loop Supply Chains*’ (CLSCs). Chapter 1 comprises the legal analysis of EPR, in particular, I am giving an overview of two fundamental International Environmental Law principles: Sustainable Development and the

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<sup>1</sup> <http://www.oecd.org/env/tools-evaluation/extendedproducerresponsibility.htm>

<sup>2</sup> *Towards the Circular Economy: an economic and business rationale for an accelerated transition*. Ellen MacArthur Foundation. 2012. p. 24.

<sup>3</sup> For further studies on the ‘Circular Economy’ visit: <https://www.ellenmacarthurfoundation.org/>

Polluter Pays Principle. Then I will describe EPR legislation in two totally different contexts: the United States of America and the European Union. EPR legislation in the US is characterized for its heterogeneity, in fact it differs from state to state and the western ones are recognized as the most virtuous, moreover EPR in the US is regulated under a product approach, that means ad hoc bills are written for specific product categories, while federal framework legislation is scarce.

The European case is particularly interesting because of the sensibility towards environmental concerns that has promoted since the 1970s consistent environmental legislation, in particular in the field of waste management. With regards to European legislation I am describing the legal principles supporting waste management policies and I will refer also in this case to Sustainable Development and the Polluter Pays Principle, declined in the European legal corpus. Then I will describe the European Policy on Waste, focusing on some significant Directives correlated to the discussion of Chapter 2. These Directives are Directive 2008/98/EC on Waste, Directive 2000/53/EC on end-of-life vehicles, Directive 2006/66/EC on batteries and accumulators and waste batteries and accumulators, and Directive 2012/19/EU on waste electrical and electronic equipment, amended respectively by Directive 2018/851 and Directive 2018/849 that converged in the wider *'Circular Economy Package of 2018'* that aims at *"closing the loop of product life-cycles"*<sup>4</sup> and which became law the 4<sup>th</sup> July of 2018; the Circular Economy Package will be discussed in these pages.

Chapter 2 describes *'Closed-Loop Supply Chains'* (CLSCs) that are supply chains where the traditional forward flow of materials from suppliers to final customers is implemented by a reverse flow of products back from the customer to the original manufacturer. Reverse Logistics' objective is therefore to retrieve the value of products that once they reach their end-of-life/use would be discarded by recovering the components or resources they are made of. This chapter will entail literature evidence on its application, in particular with regard to the design of

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<sup>4</sup> [http://ec.europa.eu/environment/circular-economy/index\\_en.htm](http://ec.europa.eu/environment/circular-economy/index_en.htm)

CLSCs, how to make them marketable and lastly I am describing how they can cope with EPR legal requirements.

Chapter 3 will provide two business cases which will portray on-field application of EPR legislation jointly with CLSCs. The first case '*Ecopneus SCPA*' depicts the business model of an Italian company that has been created as the result of the introduction of Producer Responsibility in the field of end-of-life tyres, while the latter, '*Light Recycle Washington*' is the case of an American-based company that takes care of the disposal of mercury-containing lights following the application of a '*Product Stewardship*' (equivalent of EPR) bill in the Washington state.

# CHAPTER 1: EXTENDED PRODUCER RESPONSIBILITY LEGISLATION

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## 1. EPR'S LEGISLATION RATIONALE IN INTERNATIONAL LAW PRINCIPLES

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### A. SUSTAINABLE DEVELOPMENT PRINCIPLE IN INTERNATIONAL AGREEMENTS

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Sustainable development is a concept that has been included in the latest 30 years several Resolutions, Declarations, and Conventions at international level (UN level) and it involves international effort in the fields of environmental conservation, development and human rights<sup>5</sup>. It has been acknowledged for the first time by the international community in 1972 during the Stockholm Conference on the Human Environment; despite the phrase 'sustainable development' was never specified during the Conference, it was established that environmental protection and economic development were supposed to go hand in hand from that moment on.<sup>6</sup>

The Stockholm Conference was promoted by the Sweden Government that proposed the UN to call for a United Nations General Assembly (UNGA) to discuss about the growing environmental concern. The conference was held in Stockholm from 5 to 16 June 1972, producing the Stockholm Declaration<sup>7</sup>; this treaty is formed by a preamble and 26 principles. The Declaration, according to

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<sup>5</sup> Schrijver, N. J. (s.d.). Chapter IV. Grounding of Sustainable Development in International Law. In *The Evolution of Sustainable Development* (p. 288-232).

<sup>6</sup>Barral, V. (2012). Sustainable Development in International Law: Nature and Operation of an Evolutive Legal Norm. *European Journal of International Law* and Nolte, Georg, "Chapter VII. Environmental treaties (Vol392)", in: *Collected Courses of the Hague Academy of International Law*, The Hague Academy of International Law

<sup>7</sup> Declaration of the United Nations Conference on the Human Environment. Stockholm, 16 June 1972.



several delegates that participated to the Declaration, represents the beginning of international environmental law<sup>8</sup>.

The preamble,<sup>9</sup> despite referring to the people of the world, it mainly directs governments. It shows an anthropocentric vision, in fact it depicts “*man (is) at once the creature and moulder of his environment*”. The protection of the human environment is envisioned as a basic human right (Principle 1) at the same time this is considered as a problem for economic development. The right to an adequate standard of living is also considered in Art. 25 (1) Universal Declaration of Human Rights that states: “*Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control*”.<sup>10</sup> Along with this rights, it is introduced the duty to preserve the environment for present and future generations. Principle 9 to 12 take into consideration the situation of developing countries, stressing that the way to overcome under-development is through financial and technical assistance and that national policies should contribute to the development of poorer countries. The Declaration therefore underlines the necessities of developing countries and future generations. Principle 21 is of relevant importance as it represents what today is considered a basic norm of customary international law, that is “*States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction*”. According to a majority opinion of the International Court of

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<sup>8</sup> See: Barral, V. (2012). Sustainable Development in International Law: Nature and Operation of an Evolutive Legal Norm. *European Journal of International Law* and Nolte, Georg, “Chapter VII. Environmental

<sup>9</sup> For follow-up: Shelton, D. (2008, July). *Stockholm Declaration (1972) and Rio Declaration (1992)*. Viewed January 23, 2019 from Oxford Public International Law: <http://opil.ouplaw.com/view/10.1093/law:epil/9780199231690/law-9780199231690-e1608>

<sup>10</sup> Universal Declaration of Human Rights . General Assembly Resolution 217 A.

Justice, this provision is included in the scope of international environmental law<sup>11</sup>; even though the Stockholm Declaration is a non-binding declaration.

For this reason, and for the resonance it had on forthcoming institutions and public opinion the Stockholm Declaration is recognized as a turning point for international environmental law.

In 1983, the UNGA formed the World Commission on Environment and Development (WCED), known as the Brundtland Commission, whose objective was to evaluate significant environmental problems and to make proposals on the issue. In 1987 it included for the first time<sup>12</sup> specific elements related to sustainable development and defined it as what "*meets the needs of the present without compromising the ability of future generations to meet their own needs*"<sup>13</sup>; this definition, of course has not a legal validity.

<sup>14</sup> Owing to the results of the Brundtland Report the UN organized the Rio Conference on Environment and Development of 1992, which is considered as the successor of the Stockholm Conference; Agenda 21 is considered its blueprint. For the first time the notion of 'sustainable development' got legal recognition; despite the Rio Declaration<sup>15</sup> is a non-binding declaration it is characterized by a strong legal connotation in fact, the term 'sustainable development' is cited throughout the document.

The principles within the declaration are the result of the compromise between developed and developing countries; the first category demanded the introduction of principles related to access on public information on environmental problems (Principle 17), on the precautionary principle (Principle 15) and the polluter pays

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<sup>11</sup> [Nuclear Weapons Advisory Opinions] 241–42; Gabčíkovo-Nagymaros Case 41)

<sup>12</sup> Schrijver, N. J. (s.d.). Chapter IV. Grounding of Sustainable Development in International Law. In *The Evolution of Sustainable Development* (p. 288-232).

<sup>13</sup> Our Common Future, Chapter 2: Towards Sustainable Development. I Conclusion. From Report of World Commission on Environment and Development: Our Common Future. Transmitted to the General Assembly as an Annex to document A/42/427 – Development and International Co-operation: Environment

<sup>14</sup> See: Barral, V. (2012). Sustainable Development in International Law: Nature and Operation of an Evolutive Legal Norm. *European Journal of International Law* and Nolte, Georg, "Chapter VII. Environmental

<sup>15</sup> Report of the United Nations Conference on Environment and Development. Rio Declaration on Environment and Development. (3-14 June 1992)

principle (Principle 16), while the latter group bargained for the inclusion of the rights to development, poverty alleviation, and recognition of ‘common but differentiated responsibilities’<sup>16</sup>.

Despite several principles resemble the ones in the Stockholm Declaration, a novel aspect is the introduction of sustainable development (as it was determined by the Bruntland Commission); Principle 21 of the Stockholm Declaration is reaffirmed by Principle 2 Rio Declaration although it adds the word ‘*developmental*’.

Like its predecessor, the Rio Declaration has been inspiring for several national and international agreements as well as non-state actors.

In 1997, during the Rio +5 Conference it was remarked that sustainable development laid on three pillars: environmental protection, economic development and social development; this was confirmed during the Johannesburg Summit for Sustainable Development in 2002.<sup>17</sup>

The members of more than 190 countries<sup>18</sup> have confirmed their compromise to the Rio Declaration from 26 August to 4 September 2002 in Johannesburg, South Africa, adopting a Declaration on Sustainable Development, based on development and poverty abatement, in particular in poorest nations.

The expression 'sustainable development'<sup>19</sup> as such can be linked to two principles: intergenerational and intra-generational equity. The first principle deals with the adjective 'sustainable', leitmotiv of the Bruntland Report's definition and mentioned in principle 3<sup>20</sup> of the Rio Declaration which claims that states while planning their

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<sup>16</sup> See: Shelton, D. (2008, July). *Stockholm Declaration (1972) and Rio Declaration (1992)*. Viewed January 23, 2019 from Oxford Public International Law: <http://opil.ouplaw.com/view/10.1093/law:epil/9780199231690/law-9780199231690-e16089>

<sup>17</sup> See: Schrijver, N. J. (s.d.). Chapter IV. Grounding of Sustainable Development in International Law. In *The Evolution of Sustainable Development* (p. 288-232).

<sup>18</sup> See: Shelton, D. (2008, July). *Stockholm Declaration (1972) and Rio Declaration (1992)*. Viewed January 23, 2019 from Oxford Public International Law: <http://opil.ouplaw.com/view/10.1093/law:epil/9780199231690/law-9780199231690-e16089>

<sup>19</sup> See: Barral, V. (2012). Sustainable Development in International Law: Nature and Operation of an Evolutive Legal Norm. *European Journal of International Law* and Nolte, Georg, “Chapter VII. Environmental treaties (Vol392)”, in: *Collected Courses of the Hague Academy of International Law*, The Hague Academy of International Law

<sup>20</sup> Report of the United Nations Conference on Environment and Development. (Rio de Janeiro, 3-14 June 1992) Annex I Rio Declaration on Environment and Development.

development policies must take into consideration the next generations to whom should give back<sup>21</sup> what they did have received; in sum equity between generations must be guaranteed. Intra-generational equity instead has to do with the word 'development' and requires equity between the same living generations, both internally and at international level, in particular with developing societies. Sustainable developments can exist only when inter-generational and intra-generational equity are achieved. Because of such an evolutionary principle as sustainable development, that lays on inter-generational solidarity it is difficult to determine who are the actors involved, considering that 'future generations' do not exist yet as subjects and therefore they cannot appeal to any legal protection<sup>22</sup>. Moreover, due to the multidisciplinary around the notion of sustainable development, that goes well-beyond its legal scope, legal technicalities are not enough to regulate such a broad notion<sup>23</sup>. But still, according to Barral the legal nature of a principle can be assessed if recognized as binding by any international treaty. With regard to the former parameter, the legal scope of sustainable development has been confirmed by the Rio Declaration, in fact "*it is formulated in terms of rights and obligations and uses prescriptive language throughout*"<sup>24</sup>.

The importance of the principle of sustainable development has been confirmed by international (semi-) jurisprudence. <sup>25</sup>Relevant are the decisions of the International Court of Justice. For instance, in its Opinion on the Legality of the Threat or Use of Nuclear Weapons (1996) the ICJ, while describing the environment and human living space, stressed the role future generations: "*The environment is not an abstraction, but represents the living space, the quality of life and the health of human beings, including generations unborn.*"<sup>26</sup>.

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<sup>21</sup> See: Schrijver, N. J. (s.d.). Chapter IV. Grounding of Sustainable Development in International Law. In *The Evolution of Sustainable Development* (p. 288-232).

<sup>22</sup> Antonioli, M. (2017). La sostenibilità dello sviluppo tra principi del diritto, proceduralizzazione, eticità e crescita economica. *Rivista Italiana di Diritto Pubblico Comunitario*, 1(1), 17-36, p.23.

<sup>23</sup> See: 22

<sup>24</sup> Barral, V. (2012). Sustainable Development in International Law: Nature and Operation of an Evolutive Legal Norm. *European Journal of International Law*, p. 383.

<sup>25</sup> See: Universal Declaration of Human Rights . General Assembly Resolution 217 A.

<sup>26</sup> Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, 8 July 1996, ICJ Reports 1996, p. 226, at p. 241, para. 29.

Sustainable development has been acknowledged by treaties especially under a trade and environment relationship perspective; for instance the preamble of the Constituent Treaty of the WTO of 1994 states: *“that (their) relations in the field of trade and economic endeavour should be conducted with a view to raising standards of living, ensuring full employment and a large and steadily growing volume of real income and effective demand, and expanding the production of and trade in goods and services, while allowing for the optimal use of the world’s resources in accordance with the objective of sustainable development, seeking both to protect and preserve the environment and to enhance the means for doing so in a manner consistent with their respective needs and concerns at different levels of economic development”*<sup>27</sup>. The sentence *“optimal use of the world’s resources in accordance with the objective of sustainable development”* substituted the previous GATT objective of *“developing the full use of the resources of the world”*<sup>28</sup> It is evident therefore that the objective of the WTO is to reach economic well-being to pursue with respect of the environment; this aspect has been partially derogated for developing countries, as of the notion of ‘common but differentiated responsibilities’.

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#### A. EPR AS AN APPLICATION OF THE POLLUTER PAYS PRINCIPLE

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##### WHAT IS THE POLLUTER PAYS PRINCIPLE?

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The Polluter Pays Principle (PPP) was born in the field of the economic sciences and assumed the internalization<sup>29</sup> of environmental costs in the price of products and services in order to efficiently shift polluters’ choice towards less<sup>30</sup> impacting production process; this principle was then adopted by environmental law.<sup>31</sup> The PPP in environmental law embraces three dimensions, the preventative, the compensative and the sanctioning ones.

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<sup>27</sup> Agreement Establishing the World Trade Organization, Marrakesh, 15 April 1994, entered into force on 1 January 1995; 33 ILM 1125 (1994).

<sup>28</sup> See: Universal Declaration of Human Rights . General Assembly Resolution 217 A.

<sup>29</sup> Lindhout, P. E., & Van den Broek, B. (2014). The Polluter Pays Principle: Guidelines for Cost Recovery and Burden Sharing in the Case Law of the European Court of Justice. *Utrecht Law Review*, 10(2).

<sup>30</sup> Coly, R. A. (2012). Development and Implementation of the Polluter Pays Principle in International Hazardous Materials Regulation. *Environmental Claims Journal*, 24(1), 33-50.

<sup>31</sup> Salassa Boix, R. (2016). The Coordinated Application of the Polluter-Pays and Ability to Pay Principles. *Revista Chilena de Derecho*, 43(3), 1005-1030, p 1005.

The preventative dimension aims at preventing that damages occur and can be further divided into a persuading and dissuading functions; the first function intends to avoid environmental harm by according benefits to those actors that act in an environmentally respective way, while the dissuading one is fulfilled by the threat of imposing costs to those that pursue polluting activities.

The repairing dimension aims at returning the environment to the status quo or, when this is not possible, by imposing an indemnification for the damages to the community. Lastly the sanctioning dimension aims at prosecuting those who severely damaged the environment at the expenses of the whole collectivity.<sup>32</sup>

In 1972 the OECD defined PPP as follows: *"The principle to be used for allocating costs of pollution prevention and control measures to encourage rational use of scarce environmental resources and to avoid distortions in international trade and investment is the so-called 'Polluter-Pays Principle'. This principle means that the polluter should bear the expenses of carrying out the above-mentioned measures decided by public authorities to ensure that the environment is in an acceptable state. In other words, the cost of these measures should be reflected in the cost of goods and services which cause pollution in production and/or consumption. Such measures should not be accompanied by subsidies that would create distortions in international trade and investment."*<sup>33</sup>

Interpreting the principle literally is however naïve<sup>34</sup> as its meaning goes beyond its denomination. Actually any human activity has impact on the environment and it is evident that not all of them are subjected to a contribution; the reason of this can be found in the principle of sustainable development which provides that current growth cannot deter the next generations' opportunities, therefore what makes the development unsustainable is not the mere polluting but not respecting inter-generational equity of natural resources. It is interesting however, the recommendation stating that the PPP has not the objective to bring pollution down to a certain level, even though this is not excluded.<sup>35</sup>

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<sup>32</sup> (Salassa Boix, 2016)

<sup>33</sup> Guiding principles concerning international economic aspects of environmental policies. (Recommendation adopted on 26<sup>th</sup> May, 1972) C(72)128, p. 517.

<sup>34</sup> See: (Coly, 2012)

<sup>35</sup> (Coly, 2012, p. 518)

Another issue is whether the compensation has a pecuniary or a non-economic nature (prison) rather than returning the situation to the status quo; for this and the above reasons it emerges the wide connotation of the PPP.<sup>36</sup>

The organization gave clearer guidance with its Recommendation on the Implementation of the Polluter Pays Principle in 1974 that required member nations to work together and apply the PPP evenly and to avoid to provide polluters with any grant<sup>37</sup>. These definitions lay both environmental and free-trade concerns; the OECD claimed in fact that if a producer's responsibility was not applied, competition could as a result be distorted.

At the beginning the scope of the PPP was only on pollution prevention and control, and therefore it can be defined as PPP in a 'strict sense' or 'standard PPP'; the Polluter Pays Principle has been imposed in order to deal with environmental 'externalities' and it is enforced by governments<sup>38</sup> if they supervise what is leaked in the environment and impose polluters to install leakage control tools, impose duties to cover environmental expenses, and make sure polluters are responsible for their environmental impact. According to Beder<sup>39</sup> however, the aim of the PPP, is not to charge a fee so that polluters are permitted to contaminate, but to make polluters responsible for their impact<sup>40</sup> therefore PPP should be tied with standards and regulations. Exceptions to the PPP are accorded in the form of public financial support for research and development of pollution control facilities for sectors or regions in struggle. In any case those subsidies according to the OECD are transitory and cannot distort international trade and development in other words that means that the free market remains a sacrosanct principle even with environmental protection. The same OECD in 1989 published a Recommendation on the Application of the Polluter-Pays Principle to Accidental Pollution that

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<sup>36</sup> See: 31

<sup>37</sup> OECD, "Recommendation on the Implementation of the Polluter-Pays Principle," section III - 1, November 14, 1974

<sup>38</sup> See: Beder, S. (2006). *Environmental principles and policies : an interdisciplinary introduction*. London: Sterling, Va. : Earthscan.

<sup>39</sup> See: 38

<sup>40</sup> See: (Salassa Boix, 2016)

includes measures regarding accidental damages and actions to be taken by governments to impede disasters.

During the 90s the PPP widened its scope as it was assumed that it would have been better to charge polluters with levies in order to make them more efficient.

In 1991, the OECD Recommendation on the Use of Economic Instruments in Environmental Policy required the PPP to include costs of environmental harm to be borne by polluters who should also be charged of preventive costs.

The 1992 Rio Declaration<sup>41</sup> represents the most important development since the OECD's recommendation of 1972; in particular Principle 16 defined PPP in a wider sense: *"National authorities should endeavour to promote the internalisation of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment"*<sup>42</sup>. What emerges from this principle is that PPP must be imposed at national level and does not take into consideration the international bonds <sup>43</sup> moreover respect of international trade and investment is still a fundamental point. It has been shown that since the implementation of PPP after the 90s not only it had any negative consequence on economic development but it demonstrated to have created technology dealing with pollution control that has shown to be extremely remunerative.

The Polluter Pays Principle is influenced by Sustainable Development and practical applications of this assumption are for instance, eco-design, increase of recovery rates and efficacy of recycling facilities, in sum Extended Producer Responsibility (EPR) or Product Stewardship; the link between PPP and EPR is evident considering the role that manufacturers can have in 'closing the loop' or determining the level of pollution of their activities.

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<sup>41</sup> United Nations Conference on Environment and Development, Rio Declaration on Environment and Development, Principle 16, June 1992

<sup>42</sup> See: 41

<sup>43</sup> See: (Salassa Boix, 2016)



## INTERNATIONAL RECOGNITION OF THE POLLUTER PAYS PRINCIPLE

Other international agendas including the Polluter Pays Principle are: 1985 ASEAN Agreement on the Conservation of Nature and Natural Resources, 1990 Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC), 1992 Helsinki Convention on the Transboundary Effects of Industrial Accidents, 1996 London Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 2001 Stockholm Convention on Persistent Organic Pollutants.

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### B. EXTENDED PRODUCER RESPONSIBILITY (EPR)<sup>44</sup>

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*"Extended Producer Responsibility means the idea of internalizing waste management considerations into overall product strategies by making the producer responsible for his products once they have become waste. "*

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EPR presupposes that each actor benefitting from a certain product should bear the responsibility of its disposal, namely by internalizing disposal's costs into the product price; this leads to environmental protection pursued with an economic tool but also implies that future generations shall not bear any cost.<sup>46</sup> Producer's responsibility is seen differently in the United States and in the European Union<sup>47</sup>; this differences can lead to potential trade controversies and therefore attempts to harmonized extended producer responsibility systems are being studied.

EPR responsibilities are both functional and financial: the first one implies all the working activities related to recycling: collection, take-back, recovery and recycling of waste. This function can be commissioned to a third-party, however this does not exclude the responsibility of the producer. Financial responsibility consists in the economic liability the manufacturer has for the disposal of its products; these responsibilities do not necessarily overlap.

In the United States, EPR is often regarded as product stewardship, a concept that has broadly the same elements of EPR.

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<sup>44</sup> For follow-up see: Kalimo, H. (2006). *E-Cycling. Linking Trade and Environmental Law in the EC and the U.S.* Transnational Publishers, Inc

<sup>45</sup> (Kalimo, 2006, p. 455)

<sup>46</sup> See: Report of the United Nations Conference on Environment and Development. (Rio de Janeiro, 3-14 June 1992) Annex I Rio Declaration on Environment and Development

<sup>47</sup> See: (Kalimo, 2006)

## COLLECTIVE OR INDIVIDUAL FULFILLMENT OF PRODUCER RESPONSIBILITY?

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It derives from the Polluter Pays Principle that the polluter must bear the technical and financial costs to recover the environment to the situation that preceded the polluting activity; more specifically with regard to the topic of this writing the costs related to waste management. Producers can decide to pay for their own impact and therefore individually fulfill their producer responsibility or to engage to professional organisations that fulfill producer responsibility in name of its partners. There is no consent between the choice of a collective rather than an individual fulfillment of producer responsibility ; disagreement exists both at industrial and political level, in fact the European Parliament and the Council (it endorses collective mechanisms) have opposite ideas on that.

According to Kalimo an Individual Responsibility would be more appropriate as it regards it to be more in compliance with the Polluter Pays Principle, but also because it is fairer as it is directed to specific consumers or producers and it promotes eco-design.

Choosing between a collective or individual fulfillment of producer responsibility therefore influences the application of the polluter pays principle and indirectly according to the author it can have free trade implications, in fact a fixed and collective fee will erase the competitive advantage of an efficient importer, while can favor the producer who less contributed to the system.

A collective fulfillment of producer responsibility however is deemed to be more transparent<sup>48</sup>, easy and less expensive to implement, therefore in case of no discrimination, this system can be acceptable both in the United States, respecting the Dormant Commerce Clause and in the European Union, under the Keck Doctrine of the European Court of Justice, compatible with Article 34 TFEU. Another issue related to collective fulfillment emerges in case of retroactive environmental responsibility, as this model unlike the individual one can create problems of legal certainty and equality, particularly in case of orphan products - products whose manufacturers are not anymore in the market once they reach their end-of-life; therefore the financing of this disposal will spill upon current manufacturers, that is not in compliance with the polluter pays principle.

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<sup>48</sup> See: (Kalimo, 2006)

## 2. EPR LEGISLATION IN THE UNITED STATES

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### A. CHARACTERISTICS OF THE US MODEL

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In the United States a statutory approach<sup>49</sup> dominates over a regulation<sup>50</sup> one based on a framework environmental law like in the European Union.<sup>51</sup> In this context the federal government plays a lesser role in comparison with states; statutes are rather detailed and set specific goals, such as recycling targets, standards on collection's activities or precondition for certain activities; this model despite being accountable has shown to lack of flexibility that is a limiting condition for an evolving legislation such as the one on Extended Producer Responsibility.

In the American context besides state environmental agencies play a relevant role in the monitoring and assessing the conformity and implementation of EPR statutes, useful to take control of *'free riders'*, that are companies that benefit from EPR programs but do not financially contribute to it.

The prevalent collecting system is a variant of individual responsibility; it makes individual companies responsible for the collection and processing activities needed to reach their legal obligation that is based on their market proportion of goods returned and financed through the imposition of fees on EPR services offered by the states and regarded as taxes. The reason of this individual model lays on the US' competitive scenario which is heterogeneous and at the same time the cooperation among companies is limited, however the main reasons of this choice are issues regarding antitrust or anticompetitive requirements that are more likely to be present in a collective system. However this model is changing because of the

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<sup>49</sup> Statutory obligations are required by law and refer to current laws that were passed by a state or federal government From <https://www.tripwire.com/state-of-security/regulatory-compliance/statutory-vs-regulatory-vs-contractual-compliance/> Viewed September 22, 2018

<sup>50</sup> Regulatory obligations are required by law, but they are different from statutory requirements in that these requirements refer to rules issued by a regulating body that is appointed by a state or federal government. These are legal requirements through proxy, where the regulating body is the source of the requirement From <https://www.tripwire.com/state-of-security/regulatory-compliance/statutory-vs-regulatory-vs-contractual-compliance/> Viewed September 22, 2018

<sup>51</sup> For follow-up: Hickle, G. T. (2014). Moving beyond the "patchwork". A review of strategies to promote consistency for extended producer responsibility policy in the U.S. *Journal of Cleaner Production*, 64, 266-276

formation of new collective organizations, such as Paint Care in Oregon and California or the Carpet America Recovery Effort (CARE) in California, financed by statutorily authorized eco-fees.<sup>52</sup>

EPR legislation has not spread in the US as much as in the European Union because of the structural differences between the two cases<sup>53</sup>. First of all in fact they have completely different political traditions and the United States' heritage is characterized by a strong belief in individual responsibility and property rights; the legacy of the western frontier; quantity of spare areas for landfills; distrust towards political organs; possibility for American industries to obstacle the implementation of environmental legislation (by support during electoral campaign, lobbying and judicial processes) and the presence of a Presidential model that disincentive to endorse the President's agenda, especially when different parties control the Congress and the White House. A further issue linked to policy making in the US is the rising of the political right (traditionally antagonistic towards environmental legislation) in the White House, Congress and states' governments in the US<sup>54</sup>. An aspect to take into consideration is besides that the Federal government cannot force State's governments to adopt specific environmental policies. Last but not least the US has always disregarded the character of product externalities and the responsibility of the individual in producing them. In fact it is evident that the general public has little awareness of its impact; *"the producers and consumers both face a zero price for waste disposal has undoubtedly contributed to a throwaway mentality in production and consumption decisions, to greatly excessive packaging, and to an inattention to the environmental impacts of product design. Despite these concerns, there is very little sense of crisis among the American public, and very little public pressure in the United States to take a more comprehensive approach to waste and consumption decisions"*<sup>55</sup>.

Unlike the European Union, there is a different recognition of who is the polluter and as of the mid 1990s, when the Clinton's Administration's President's Council on

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<sup>52</sup> See: idem

<sup>53</sup> See: Sachs, N. (2006). Planning the Funeral at the Birth: Extended Producer Responsibility in the European Union and the United States. *Harvard Environmental Law Review*, 30, 51-98, p. 86

<sup>54</sup> See: Sachs, N. (2006).

<sup>55</sup> See: (Sachs, 2006, p. 89)

Sustainable Development (PCSD) was held, the concept of Extended Producer Responsibility was extended to all the actors throughout the product chain (manufacturers, distributors, retailers, consumers and municipalities).

The main reason for moving to EPR systems is that local governments and municipalities - that traditionally have dealt with waste management, are looking for shifting this duty to manufacturers. Another reason for the implementation of EPR legislation is concern for the presence of toxics in the environment as a result of leaking landfills and polluting incinerators.<sup>56</sup>

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## B. FEDERAL VERSUS STATE LEVEL

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*"It is one of the happy incidents of the federal system that a single courageous State may, if its citizens choose, serve as a laboratory; and try novel social and economic experiments without risk to the rest of the country"*<sup>57</sup>

There is an important discrepancy<sup>58</sup> about EPR strategies at federal, state and local level. The main reason why EPR legislation is still pursued at state rather than federal level it is waste management is a function traditionally pursued by state administrations. Moreover, the US context shows a lack of commitment at the federal level that has strengthened the role of states whose policy efforts are on specific products even if shifting to a broader producer responsibility is in progress. The *'product by product'* approach is the traditional path followed in the US and implies adopting specific legislation on product categories; as a consequence when a state decides to regulate a new product it has to go through an ad hoc new legislative process. As any law, the proposal must be accepted by both chambers of the legislature and then approved by the governor. It goes without saying that the legislative draft will be challenged by lobbies and interest group during the political process.

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<sup>56</sup> See: Nash, J., & Bosso, C. (2013). Extended Producer Responsibility in the United States: Full Speed Ahead? *Journal of Industrial Ecology*, 17(2), 175-185.

<sup>57</sup> *New State Ice Co. v. Liebmann*. 285 U.S. 262 (1932).

<sup>58</sup> See: 51

A framework law instead regulates more products through a single bill. The framework law, as of January 2013 regulates EPR in the following states: California, Massachusetts, Minnesota, New York, Oregon, Rhode Island, Vermont and Washington.<sup>59</sup>

Reaching a consistent EPR program in the US is difficult because of the divide between the state and the federal level and despite this being advantageous, it is a challenging goal because of "*differing constituencies, political contexts and past experience with EPR*".<sup>60</sup>

Even though a state perspective on EPR appears as more convenient - it has shown to hinder consistency. Another issue is the inadequacy of a broader recognition of factors influencing program design and policy decisions, besides the absence of a compromise among manufacturers leads to poor EPR national programming. Realizing consistency despite being desirable, demands a strong commitment by brand owners that would reflect into policy leadership and competence to operate and influence an inter-state political arena. This is really demanding because manufacturers are very likely to have different business models and supply chains, besides demanding important financing.

Silver linings of the implementation of a broader national EPR program are: limitation of drawbacks coming from the interpretation of different states' provisions that would lead to economies of scale, decrease in staff hired and means to sustain state monitoring and better evaluation and analysis of how the EPR program is operating states-wide.

## EPR LEGISLATION AT FEDERAL LEVEL

EPR legislation adopted at federal level according to [www.productstewardship.net](http://www.productstewardship.net) regulates the chemical (including mercury) and electronics sectors. With regard to the chemical sector, the very first product stewardship law at federal level dates back

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<sup>59</sup> See: Austin, A. A. (2013). Where Will All the Waste Go: Utilizing Extended Producer Responsibility Framework Laws to Achieve Zero Waste. *Golden Gate Univ. Environmental Law J.*, 6, 221-257

<sup>60</sup> See: (Hickle G. T., p. 267)

to the 70s. Its name is Toxic Substances Control Act (TSCA)<sup>61</sup> and allows the United States Environmental Protection Agency (US EPA) to monitor and regulate the flow of chemical substances.<sup>62</sup>

The first concerns on chemical substances released in the environment go back to 1970s when the Council on Environmental Quality realized that chemical substances having negative consequences had being released in the environment and that the legislation at the time was not adequate, therefore it suggested new regulations to be adopted. This bill was bargained among the Congress, the reformed US EPA, the Commerce Department, the chemical industry and other actors; the negotiations were hard as the suggested Toxic Substances Control Act (TSCA) was deemed to be harming for the industrial sector considering that the US were experiencing an economic turmoil as a consequence of the OPEC embargo of 1973.

The Act eventually was adopted in 1976 and it is the fruit of the conciliation between environmental and industry interests. The bill entrusted the US EPA to: demand private industry data and information about the chemicals used; preclude or bind the retailing of new or existing substances suspected to be harmful. It influenced the administration of toxic substances for the following 40 years.

The TSCA works in a preventative manner and it assesses if chemical substances are harmful once they show they are hazardous.

The TSCA Bill's main sections interesting for this discussion are the following: Section 8, stating that the US EPA can ask for information regarding current chemicals; manufacturers must register the negative effects of their substances on both human health and the environment. Section 4 declares that the US EPA can ask producers, importing wholesalers and users to test their substances when it is assessed that they can be related with certain risks. Section 6 determines that if the US EPA recognizes the existence of unreasonable risk to health or to the

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<sup>61</sup> 15 U.S.C. §2601 et seq. (1976)

<sup>62</sup> For follow-up: Sellers, K. (2015). *Product Stewardship: Life Cycle Analysis and the Environment*. Taylor & Francis

environment, it can request hazard-lowering measures such as labeling of harmful substances but also regulating or binding the substance's circulation.

## HIGH PRODUCTION VOLUME (HPV) CHEMICALS

The US EPA defines HPVs as "*as those chemicals produced or imported in the United States in quantities of 1,000,000 pounds or more per year*"<sup>63</sup>. At the end of the 90s the US EPA recognized that data on these chemicals were not nationally published and as a consequence it developed a voluntary program where producers and importers could upload health and environmental information. About 2,200 chemicals are defined as HPVs; the US EPA consolidated information over 900 chemicals and evaluated circa one quarter of them. Lacking an adequate legislation, in 2012 the agency implemented the following plan of action to deal with existing substances: risk assessment and risk reduction, data collection and screening, public access to chemical data and information.

A selection of 15 chemicals (as of 2014) has emerged for further action: HPV chemicals, chemicals identified as persistent bio-accumulative, and toxic (PBT) chemicals in consumer products, chemicals potentially of concern for children's health because of reproductive or developmental effects, chemicals subject to review and potential action in international forums, chemicals found in human bio-monitoring programs, chemicals in categories generally identified as being of potential concern in the new chemicals program.

The US EPA will take measures towards these chemicals according the authority mandated by Section 6.

## POWERS UNDER SECTION 6 OF THE TSCA

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<sup>63</sup> Sellers, K. (2015). *Product Stewardship: Life Cycle Analysis and the Environment*. Taylor & Francis, p. 57



Under Section 6 the US EPA has therefore the authority to limit or ban the use of a substance; however this can be done in case it believes there is an *'unreasonable risk'*<sup>64</sup> at stake, and only if an existing Federal law does not cover the subject. Once it has been assessed a substance can have an *'unreasonable risk'* the US EPA must implement certain measures<sup>65</sup>.

From 1976 to 1979 the US EPA did not fulfill its authority rights, however in 1979 it issued an Advance Notice of Proposed Rulemaking (ANPRM) where it depicted how it wanted to use its authority under Section 6 to assess the hazards linked to the use of asbestos; in 1986 it proposed a bill to rule asbestos (regarded as carcinogenic) and eventually it delivered a final regulation that would *"prohibit, at staged intervals, the future manufacture, importation, processing, and distribution in commerce of asbestos in almost all*

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<sup>64</sup> Section 6 of TSCA requires the agency to take into consideration:

- A. the effects of such substance or mixture on health and the magnitude of the exposure of human beings to such substance or mixture,
- B. The effects of such substance or mixture on the environment and the magnitude of the exposure of the environment to such substance or mixture,
- C. The benefits of such substance or mixture for various uses and the availability of substitutes for such uses, and
- D. The reasonably ascertainable economic consequences of the rule, after consideration of the effect on the national economy, small businesses, technological innovation, the environment, and public health.

<sup>65</sup> ... the Administrator shall by rule apply one or more of the following requirements to such substance or mixture to the extent necessary to protect adequately against such risk using the least burdensome requirements:

1. A requirement
  - a. prohibiting the manufacturing, processing, or distribution in commerce of such substance or mixture, or
  - b. limiting the amount of such substance or mixture which may be manufactured, processed, or distributed in commerce.
2. A requirement
  - a. prohibiting the manufacture, processing, or distribution in commerce of such substance or mixture
    - i. for a particular use or
    - ii. a particular use in a concentration in excess of a level specified by the Administrator ..., or
    - iii. limiting the amount of such substance or mixture which may be manufactured, processed, or distributed in commerce for [particular uses]...
3. A requirement that such substance or mixture or any article containing such substance or mixture be marked with or accompanied by clear and adequate warnings and instructions with respect to its use, distribution in commerce, or disposal or with respect to any combination of such activities. ....
4. A requirement that manufacturers and processors of such substance or mixture make and retain records of the processes used to manufacture or process such substance or mixture and monitor or conduct tests which are reasonable and necessary to assure compliance with the requirements of any rule applicable under this subsection.

*products*"<sup>66</sup>. In 1991 US manufacturers filed suits against this measure and the US Court of Appeals for the Fifth Circuit agreed with them and as a result the US EPA did not apply anymore its authority under Section 6.

#### MONITORING ACTIVITIES OF THE US EPA

According to the US EPA just a portion of substances in commerce are regulated by the law, therefore the Congress in 2013 took account of the Chemical Safety Improvement Act. Section 5 of the TSCA requires that before a new chemical is manufactured or imported the US EPA must be informed. Pre-manufacture Notice (PMN) data requires exposures and information on the chemical and toxicological characteristics of the substance. TSCA however does not set a minimum level of information, but also - paradoxically the US EPA has to demonstrate the *'unreasonable risk'* before asking for specific information. Exemptions to the PMN are: low-volume production, substances developed in small volumes just for research and development, products subjected to low exposure and chemicals imported or produced for test marketing. The PMN evaluation must be pursued by the US EPA in 90 days - that is quite a challenging deadline. Another limit to the agency's work is that when it regulates certain substances it has first of all to take into consideration if federal laws exist, besides when it implements measures against manufacturers it has to choose the least heavy requirement. There is besides no definition of *'unreasonable risk'*; US EPA however when considering it, takes into account: the size of the hazard, how to limit the risk by implementing certain measures and benefits to the industry thanks to the introduction of new substances. After assessing the possible risks related to a new chemical the US EPA can limit its importation, manufacture or use. If it suspects that the substance may have certain risks it deliver a consent order to the PMN submitter requesting further information.

#### REFORMS TO THE TSCA

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<sup>66</sup> See: (Sellers, 2015, p. 60)

In 2010 there was an attempt to reform the TSCA that failed; in 2013 a new proposal for the Chemical Safety Improvement Act (CSIA) was proposed to the Senate. In June 2016 the TSCA was amended for the first time after its promulgation in 1976; on June 22, 2016 President Obama signed the Frank R. Lautenberg Chemical Safety for the 21st Century Act<sup>67</sup> that: includes binding safety reviews for traded substances; asks for alternative safer chemicals; replace the cost-benefit model to assess ‘unreasonable risk’ and that prevented asbestos to be banned into a health-based safety standard; asks for protection of vulnerable groups like children and pregnant women; allows the EPA to demand testing for current and new substances; imposes stringent, judicially enforceable deadlines for EPA decisions; makes information about chemicals more widespread.

Other EPR federal legislation includes bills regulating the chemical and electronic-waste. The US Consumer Product Safety Improvement Act of 2008<sup>68</sup> amends the 1972 Consumer Product Safety Act (CPSA) that formed the Consumer Product Safety Commission (CPSC) in order to prevent that consumers bore excessive risk linked to products' safety. The law extends the lead limit for children's products, imposes third party testing and prohibits children products containing more than 0.1 % phthalates, moreover it imposes tracking labels for childhood items. This law strengthen the role of CPSC. Other bills that were proposed at federal level but are not still converted into law are the US Safe Cosmetics Act of 2011<sup>69</sup> and the US Household Product Labeling Act of 2009<sup>70</sup>. The US Mercury Export Ban Act<sup>71</sup> prohibits to export elemental mercury to third countries.

Concerning the electronics sector the US Responsible Electronics Recycling Act (HR 2284/S 1270) was introduced in the US House of Representatives in June 2011 and promoted by the Coalition for American Electronics Recycling (CAER) with the aim to ban exporting certain electronic waste into developing countries.

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<sup>67</sup> <https://www.edf.org/health/policy/chemicals-policy-reform>

<sup>68</sup> H.R.4040 - Consumer Product Safety Improvement Act of 2008

<sup>69</sup> H.R. 2359 (112<sup>th</sup>): Safe Cosmetics Act of 2011

<sup>70</sup> S. 1697 (111<sup>th</sup>): Household Product Labeling Act of 2009

<sup>71</sup> US Mercury Export Ban Act 2008 (S 906). PUBLIC LAW 110-414—OCT. 14, 2008. 122 STAT. 4341

Formerly it was introduced by the Resolution 1395 (US E-Waste Export Resolution) in order to contrast the federal policy permitting e-waste to be exported in developing countries; state legislation cannot ban the export in third countries as this violates the constitutional authority given to the federal government to regulate international trade issues.

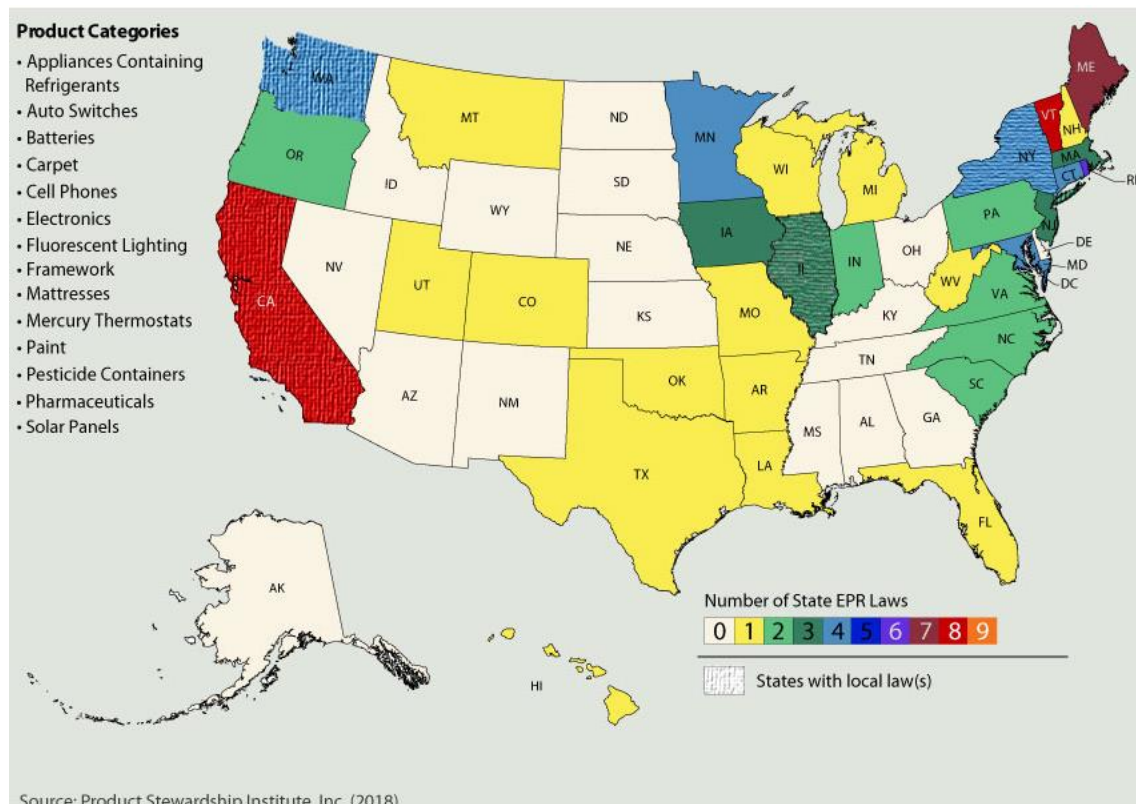


FIGURE 1 EPR LEGISLATION AT STATE LEVEL

### C. EPR'S LEGISLATION AT STATE LEVEL

The West Coast (California, Nevada, Oregon) but also Washington are associated with higher recycling and composting rates, 46% according to Austin, compared to the Rocky Mountain (Arizona, Colorado, Idaho, Montana, New Mexico, Utah, Wyoming) area that performed the lowest rate (11%); the Midwest, New England and Mid-Atlantic are in the middle (29%).

In 2010, 38 EPR bills were passed throughout the States, while at a federal level lawmakers removed potential obstacles to EPR implementation in the various States.

California, Maine and Vermont have resulted to be EPR trend-setter, however "laggards" states like South Carolina and Utah - where senators with low environmental ambitions have been elected - demonstrated sensibility towards EPR, particularly in the electronics and mercury auto sectors. In any case EPR policies vary from state to state according to their prospects on EPR.<sup>72</sup>

EPR legislation in the US has historically embraced nine product categories: mercury-filled automobile switches, batteries, carpet, cell phones, electronics, fluorescent lighting, mercury thermostats, paint and pesticide containers. During the latest years new products have been regulated: mattresses, medical sharps, smoke detectors, packaging and pharmaceutical drugs. Figure 1 illustrates the state of EPR law as of November 2018, even though it is not exhaustive, as it does not include 'Bottle Bills', which is an EPR law that imposes container manufacturers the responsibility of recovering beverage containers; currently 10 states have adopted such laws even though they are different from one state to another. The same picture describes EPR legislation based on product classification but does not take into consideration transversal laws like disposal or sales bans on noxious substances, fiscal instruments, laws imposing the responsibility for product collection for recycling to manufacturers or on green procurement.<sup>73</sup>

For the purposes of this writing I am going to give details to the following product categories: rechargeable batteries, mercury thermostats, auto switches, electronics, paint, carpet, medicines and chemicals. These results are based on 2013's work of Nash and Bosso, on the contents of [www.productstewardship.net](http://www.productstewardship.net), the official website of the Northwest Product Stewardship Council (NWPSC) a Washington and Oregon governmental organization.<sup>74</sup>

## BATTERIES AND RECHARGEABLE BATTERIES

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<sup>72</sup> See: (Nash & Bosso, 2013)

<sup>73</sup> [https://www.productstewardship.us/page/State\\_EPR\\_Laws\\_Map](https://www.productstewardship.us/page/State_EPR_Laws_Map). Viewed 1<sup>st</sup> December 2018

<sup>74</sup> <http://productstewardship.net/about>. Viewed 29<sup>th</sup> January 2019

The first states to adopt EPR laws in the country are Minnesota and New Jersey that in 1991 implemented laws for rechargeable batteries<sup>75</sup>. In 1980 Minnesota State Representative Jean Wagenius designed a piece of legislation imposing battery producers to collect and recycle mercury based dry cell batteries, while Minnesota Governor Arne Carlson bargained with manufacturers to clean mercury from battery chemistries.

The laws implemented in Minnesota and New Jersey prohibit to dispose of batteries in household trash and impose manufacturers to sell rechargeable batteries that are easily to remove and well-labelled. In New Jersey the state Department of the Environment Protection (NJ DEP) gave details about how they intend to finance collection programs, educational activities and give fair collection facilities. This law besides request manufacturers to state their recovery rates, even if the law does not give a definition of recovery rate.

The first EPR law for rechargeable batteries in California<sup>76</sup> dates back to 2006 and it includes alkaline batteries (80% of the total batteries in the US), aligning with the standards set in Europe and Canada; this act prohibits the landfilling of household batteries and imposes retailers to retrieve end-of-life batteries. Florida adopted legislation in 2008<sup>77</sup> while New York in 2010<sup>78</sup>. There have been different attempts to pass legislation: California Battery Stewardship<sup>79</sup>, Oregon Rechargeable Battery Stewardship<sup>80</sup> and Washington Small Rechargeable Battery Stewardship Act<sup>81</sup>.

## MERCURY THERMOSTATS

Mercury thermostats are an important source of mercury as each of them contains at least 4 grams of the element and attention to their disposal led in 1992 Minnesota<sup>82</sup> to adopt a law banning them to be disposed as normal trash. Because

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<sup>75</sup> (1991 Minn. Session Laws Ch. 257, N.J.Stat.Ann. §13:1E-99.66)

<sup>76</sup> (Cal. Pub. Res. Code §§42451–42456)

<sup>77</sup> (Fla. Stat.Ann. §403.7192 (2008))

<sup>78</sup> (2010 N.Y. Laws 562)

<sup>79</sup> AB-488 Recycling: household batteries

<sup>80</sup> House Bill 2938

<sup>81</sup> HB 1364/ SB 5457

<sup>82</sup> (Minn. Stat. 116.92 subd. 5).

of the bargaining power of thermostat manufacturer Honeywell<sup>83</sup> (one of the main employers in the state), the law does not impose manufacturers to finance a collection program (and therefore it does not respect the EPR's definition).

Because of this law and of the potential influence it could have on other states, thermostat manufacturers Honeywell, General Electric and White Rogers in 1998 formed the Thermostat Recycling Corporation (TRC) and since 2001 they are working at the nation level.

In 2006, the Product Stewardship Institute (PSI) bargained a model mercury thermostat legislation that could be adopted by the various states willing to take into account and fortify the Thermostat Recycling Corporation (TRC)'s voluntary program. This model was adopted in Maine<sup>84</sup> and asked manufacturers to collect a precise amount of mercury and to offer 5\$ to whoever turned a mercury thermostat for recycling; the same law asked wholesaler to take part of the process. Similar laws were adopted in 2010 in Illinois, Rhode Island, Vermont and California; Illinois and Rhode Island impose producers to collect a specific number of mercury thermostat, while Vermont followed Maine by asking manufacturers to provide a \$5 bounty to whom gave back used thermostats. California, Illinois and Rhode Island ask manufacturers to provide an incentive if collection targets are not reached. California besides asks manufacturers to provide data about the number of thermostats still on the market<sup>85</sup> and in 2011 its set a regulation that include administrative penalties to those producers that do not meet performance goals, and prohibited the sale of products made by producers not respecting EPR law.

## AUTO SWITCHES

In early 2000s it was found out another source of mercury: light switches in automobile hoods, trunks and antilock brakes, and subsequent EPR legislation was addressed to car manufacturers. The first one was adopted in Maine in 2002<sup>86</sup> and it

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<sup>83</sup> See: 56

<sup>84</sup> (2006 Me. Laws 558)

<sup>85</sup> (Cal. Health & Safety Code §§25214.8.10–25214.8.20)

<sup>86</sup> (2002 Me. Laws 656)

required car manufacturers to pay \$1 a switch to recycling facilities. New Jersey imposed auto producers to share with the state environmental agency their EPR plan and therefore pay to the state \$0.25 per switch as administrative fees<sup>87</sup>. The same happened in Arkansas except for a compensation to scrap facilities of \$5 and to the state of \$1 per switch<sup>88</sup>. Maine's collection goal is set at 90 pounds of mercury per year from the switches; the other states have set a 90% capture rate goal.

## ELECTRONICS

The first states to adopt e-waste legislation were California (2003) and Maine (2004)<sup>89</sup> and it covered laptop (but not desktop) computers, computer monitors and television; in 2009 televisions were included<sup>90</sup>. The Californian model is based on an explicit fee, while in the other states manufacturers have to finance take-back programs.

This law puts on manufacturers the sorting and recycling costs, while collection is up to local governments. Producers have individual responsibility for end-of-life products, but do not have to comply with a certain level of performance; California Cell Phone Recycling Act<sup>91</sup> impose manufacturers and California retailers and service providers to adhere to a product take-back program both individual or collective. In 2010 about 4 pounds (1.81 kg) of e-waste per capita were collected against 4 kilograms per capita in Europe and 6 pounds (2.72 kg) in Washington, Minnesota, Oregon and Wisconsin. These latter states' EPR legislation included a wider number of products than in Maine while charging the manufacturer also of the transportation and recycling cost and set a certain performance.

Oregon E-Cycles<sup>92</sup> amends the Oregon E-Cycles program<sup>93</sup> and comprehend starting from January 2015, printers and computer peripherals. This law creates

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<sup>87</sup> (2005 N.J. 54)

<sup>88</sup> (2005 Ark. Acts 649)

<sup>89</sup> (2004 Me. Laws 661)

<sup>90</sup> (2009 Me. Laws 397)

<sup>91</sup> (Chapter 891 - AB 2901)

<sup>92</sup> (SB 82)

<sup>93</sup> (HB 2626)



recycling credits and permits a credit market. Washington E-Cycle Bill<sup>94</sup> passed in 2006 and regulates covered electronic products: manufacturers have to register a pay a levy to the Department of Ecology and take part of a product stewardship plan (collective or individual). Products of manufacturers not taking part of EPR programs cannot be sold by retailers. Public awareness on the collection of electronic waste has to be jointly raised by manufacturers, state government, local governments, retailers and collection sites. Washington Electronic Product Collection, Recycling and Reuse Program <sup>95</sup> requires the Washington State Department of Ecology to cooperate with the state Solid Waste Advisory Committee in order to investigate and advice on product stewardship practices.

#### PAINT

Oregon adopted in 2009 a pilot program<sup>96</sup> asking manufacturers data regarding the amount of paint collected and what followed the collection (reusing, recycling, landfills or incineration). It imposes on producers a \$10.000 fee for submitting their EPR plan to the state Department of Environmental Quality, while \$10.000 for program monitoring. Oregon law does not set specific performance targets, just requires "convenient and available" program. California law, enacted in 2011<sup>97</sup> set objectives for reducing, reusing and recycling for unused paint. Connecticut follows Oregon's requirement of a "*convenient and available*" program.

#### CHEMICAL INDUSTRY

In 2017 California signed into law the Cleaning Product Right to Know Act<sup>98</sup> that requires manufacturers to show on both product label (by January 1, 2021) and Internet Web Site (by January 1, 2021) information on the substances contained in that product.

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<sup>94</sup> (ESSB 6428)

<sup>95</sup> (HB 2488)

<sup>96</sup> (H.B.3037, 75th Leg., Reg. Sess. (Or. 2009)

<sup>97</sup> (Cal. Pub. Res. Code §§48700–48706)

<sup>98</sup> (SB-258)

California Toxics Information Clearinghouse<sup>99</sup> enacted in 2008 ask the Department of Toxic Substances Control to create a Toxics Information Clearinghouse for the collection, maintenance and distribution of specific chemical substances. California Hazardous Chemical Regulation <sup>100</sup> requires the state Department of Toxic Substances Control to monitor and norm hazardous chemicals. The Department is empowered to limit exposure to hazardous chemicals and impose manufacturers to take responsibility of end-of-life products but also funding green chemistry funds. Washington Children's Safe Products Act of 2008 <sup>101</sup> forbids children's items containing more than 90 ppm lead, 40 ppm cadmium or 1000 pm of phtalates. California passed a similar law in 2007: Toxic Toys Bill<sup>102</sup> where it bans six phtalates. In 2007 Washington eneacted Polybrominated Diphenyl Ethers Law<sup>103</sup> which aims at eliminating polybrominated diphenyl ethers (PBDEs), flame retardants utilized in consumer products because of their high toxicity.

## MERCURY

Washington Mercury Lights Financing<sup>104</sup> was amended in March 2014 and make sure that the lighting industry takes responsibility of stewardship measures, despite its past lawsuit. The law accepts that stewardship costs are included in the price of mercury lights. Stewardship responsibility comprehend: organise collection sites across the state for mercury-containing bulbs and tubes; packaging and shipping materials, safe disposal of mercury lights and public education. Oregon Mercury in Lighting Standards<sup>105</sup> sets a standard mass of mercury that cannot be exceeded; this is the result of the compromise by the National Electrical Manufacturers Association (NEMA), the Oregon Department of Environmental Quality (DEQ) and Metro, the regional government of the Portland area. California Mercury

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<sup>99</sup> (SB 509)

<sup>100</sup> (AB 1879)

<sup>101</sup> (HB 2647/ SB 6530)

<sup>102</sup> (AB 1108)

<sup>103</sup> (HB 1024)

<sup>104</sup> (ESHB 2246)

<sup>105</sup> (SB 1512)

Thermostat Collection Act<sup>106</sup> demands thermostat producers to implement a take-back program for mercury-added thermostats. California Lighting Efficiency and Toxics Reduction Act<sup>107</sup> passed in October 2007; it required the Department of Toxic Substances Control and the California Integrated Waste Management Board to provide policy advice for the implementation of a state collection plan for end-of-life compact fluorescent lights (CFLs).

#### MEDICINES AND MEDICAL SHARPS

On March 22, 2018 Washington Medicine Stewardship<sup>108</sup> was signed into law; it imposes medicine producers to provide for the take-back of unused medicines. California Medicine Take Back (SB 966) of 2007 establishes model disposal programs in order to deal with improper disposal of medicines.

After the ban on disposing of sharps in the trash, California Sharps Disposal Bill (SB 486) imposes manufacturers to provide information on *"how the manufacturer supports the safe collection and proper disposal"* of medical sharps.

#### CARPET INDUSTRY

it is hard to recycle carpets because of their volume and of their non-renewable composition. However if correctly recycled they can convert into a variety of products like carpet fiber and backing and car and electronics part.

California Carpet Stewardship Law<sup>109</sup> passed in 2010 amending the California Public Resources Code and imposes carpet manufacturers to implement a product stewardship plan, an enhanced recyclability for carpets and promotes a market for secondary products coming from carpets' recycling. Product stewardship legislation despite being introduced in Washington and New York did not pass.

#### CONSTITUTIONAL JUDGMENT ON EPR STATE BILLS

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<sup>106</sup> (AB 2347)

<sup>107</sup> (AB 1109)

<sup>108</sup> (HB 1047)

<sup>109</sup> (AB 2398)

Because of the growing number of EPR states' legislation (under a product by product mechanism certain categories of products can be discriminated against others) it is likely that they could face constitutional scrutiny, under the Equal Protection Clause and Commerce Clause of the 14th Amendment (of the Constitution) that asserts that "*no State shall deny to any person within its jurisdiction the equal protection of the laws*"<sup>110</sup>; the rationale behind this Clause is that the Supreme Court deemed necessary to forbid "*government action that involves irrational classification*"<sup>111</sup>. Therefore state legislation has to be subjected to a rational-basis review; in the case of EPR legislation it is evident that states have consistent reasons to adopt it, spanning from the protection of the environment and environmental assets to improve public health.

The Commercial Clause allows the Congress to rule inter-state commerce and it is aimed at impeding that states' bills can afflict commerce among the States. This restriction is regarded as the "dormant Commerce Clause". In order to assess if a regulation or statute infringes the dormant Commerce Clause a two-step examination is pursued: 1. does the legislation discriminate over interstate commerce? The effect of the state's regulation opt for its internal economic interest to the detriment of external interests? 2. If the bill passes the first step (it is neither discriminatory<sup>112</sup> nor extra-territorial<sup>113</sup>) it is subjected to the Pike balancing test<sup>114</sup>; this test compares the local interest to interstate commerce burden.

As of 2013 no EPR law was subjected to constitutional scrutiny, except decision about product labeling restrictions, packaging bans and some regulations on tractor-trailers.

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<sup>110</sup> U.S. CONST. amend. XIV, § 1

<sup>111</sup> *City of Cleburne, Tex. v. Cleburne Living Ctr.*, 473 U.S. 432, 446 (1985). "*The State may not rely on a classification whose relationship to an asserted goal is so attenuated as to render the distinction arbitrary or irrational.*"

<sup>112</sup> "*It regulates or discriminates against interstate commerce, or when its effect is to favor in-state economic interests over out-of-state interests*" (*Brown-Forman Distillers Corp. v. N.Y. State Liquor Auth.*, 476 U.S. 573, 579 (1986); see also *Am. Beverage Ass'n*, 700 F.3d at 803.).

<sup>113</sup> Extra-territorial: "*it directly controls commerce occurring wholly outside the boundaries of the state*" (*Healy*, 491 U.S. at 336; *Boggs*, 622 F.3d at 645.)

<sup>114</sup> (*Am. Beverage Ass'n v. Snyder*, 700 F.3d 796, 803-04 (6th Cir. 2012) see also *Clover Leaf Creamery*, 449 U.S. at 471; *Healy v. Beer Inst.*, 491 U.S. 324, 336, 340-41 (1989); *Pike v. Bruce Church, Inc.*, 397 U.S. 137, 142 (1970).)

In general an EPR law is unlikely to be rejected *"as long as it is applied to all producers of that regulated products and is drafted in such a way that it does not directly control conduct completely outside the state's borders"*.<sup>115</sup>

EPR legislation detractors while challenging it, asserted that it is subject to problems as a result of so many different systems, the Second Circuit however stated that *"it is not enough to point to a risk of conflicting regulatory regimes in multiple states; there must be an actual conflict between the challenged regulation, and those in place in other states"*<sup>116</sup>. Besides recent EPR framework legislation impose states to collaborate together in order to obtain consistency, take into account other states' policies and involve other states in the legislative process.

It is also unlikely that EPR legislation to be constitutionally challenged because waste management has traditionally been a duty of local governments, and at the same time it fulfills the most general national interest.

### 3. EPR LEGISLATION IN THE EUROPEAN UNION: THE CIRCULAR ECONOMY PACKAGE OF 2018

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#### A. LEGAL PRINCIPLES SUPPORTING THE CIRCULAR ECONOMY PACKAGE

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#### SOURCES OF EU ENVIRONMENTAL LAW<sup>117</sup>

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Environmental concerns were formally taken into consideration at political level in 1972 during a European Council Summit where it was asserted that economic growth objective is to reduce social disparities<sup>118</sup> and called for a European environmental policy<sup>119</sup>. Later on at the Declaration of the Governments of the

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<sup>115</sup> See: (Austin, 2013, p. 253)

<sup>116</sup> (Sorrell, 272 F.3d at 112)

<sup>117</sup> For follow-up: Kramer, L. (2011). *EU Environmental Law*. London: Sweet & Maxwell

<sup>118</sup> See: Jans, H. H., & Vedder, H. H. (2012). *European Environmental Law. After Lisbon. 4th Edition*. Groningen: Europa Law Publishing.

<sup>119</sup> (Bulletin EC 1972, No.10.)

Member States meeting in the Council of 22 November 1973<sup>120</sup> on the programme of action of the European Communities on the environment it was stated that: "*Whereas in particular, in accordance with Article 2 of the Treaty, the task of the European Economic Community is to promote throughout the Community a harmonious development of economic activities and a continuous and balanced expansion, which cannot be imagined in the absence of an effective campaign to combat pollution and nuisance or of an improvement in the quality of life and the protection of the environment*".

The Environment was included for the first time in the EC Treaty in 1987, however it already existed secondary European legislation on the field. In 1987, when the EEC Treaty was changed due to the introduction of the Single European Act, the objectives of environmental policy were included in the Treaty for the first time and considered in several articles, for instance Article 130r, 130s, 130t, 100a(3) and 100a(4) EEC. In June 1990 the Community Heads of State and Government adopted a '*Declaration on the Environment*' where they asserted the right to a healthy and clean environment. With the entry into force of the Treaty on European Union (Maastricht Treaty) in 1993 the environment gained relevance as its objectives were set in Articles 2 and 3. Article 2 EC speaks of '*sustainable growth*' a notion that was widely criticized at the time because it departed from the usual '*sustainable development*'. The Treaty of Amsterdam made progress in the field of environmental law, the most notable was in the text of Article 2 EC were the notion of '*sustainable growth*' was changed into '*sustainable development*' consistently with international environmental criteria. A second improvement brought by the Amsterdam Treaty is the duty to foster an ambitious level of protection of the conditions of the environment; a further improvement was provided by the '*integration principle*' (Article 6 EC; now Article 11 TFEU) set as a general principle of EC law. After the Lisbon Treaty it was stated in Article 3 TEU that the European Union '*shall work for the sustainable development of Europe*' underlining the wide and flexible nature of the

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<sup>120</sup> Declaration of the Council of the European Communities and of the representatives of the Governments of the Member States meeting in the Council of 22 November 1973 on the programme of action of the European Communities on the environment. OJ : JOC\_1973\_112\_R\_0001\_01 CELEX : 41973X1220

concept. Article 194 TFEU creates a link between the internal market and environmental protection as part of European energy policy.

Environmental objectives set by the European Union are established by art. 3(3) of the Lisbon Treaty on European Union (TEU)<sup>121</sup> ; this provision is complemented by art. 191 of the Treaty of the Functioning of the European Union (TFEU)<sup>122</sup> .

The environment considered in the Treaty does not refer to the boundaries of the European Union, as art. 191 (1) TFEU talks of "*measures at international level and regional or worldwide environmental problems*", for instance the EU bans exporting waste to countries subjected to a less strict environmental legislation.

Art. 3 TEU and 191(1) TFEU give a wide denotation of environmental purposes, leaving few space outside EU competence. In any case art. 191 and 192 are the most

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<sup>121</sup> Consolidated versions of the Treaty on European Union and the Treaty on the Functioning of the European Union 2012/C 326/01: "*The Union shall establish an internal market. It shall work for the sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress, and a **high level of protection and improvement of the quality of the environment**. It shall promote scientific and technological advance*".

<sup>122</sup> Consolidated versions of the Treaty on European Union and the Treaty on the Functioning of the European Union 2012/C 326/01: "*1. Union policy on the environment shall contribute to pursuit of the following objectives:*

- *preserving, protecting and improving the quality of the environment,*
- *protecting human health,*
- *prudent and rational utilisation of natural resources,*
- *promoting measures at international level to deal with regional or worldwide environmental problems, and in particular combating climate change.*

*2. Union policy on the environment shall aim at a high level of protection taking into account the diversity of situations in the various regions of the Union. It shall be based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay.*

*In this context, harmonisation measures answering environmental protection requirements shall include, where appropriate, a safeguard clause allowing Member States to take provisional measures, for non-economic environmental reasons, subject to a procedure of inspection by the Union.*

*3. In preparing its policy on the environment, the Union shall take account of:*

- *available scientific and technical data,*
- *environmental conditions in the various regions of the Union,*
- *the potential benefits and costs of action or lack of action,*
- *the economic and social development of the Union as a whole and the balanced development of its regions.*

*4. Within their respective spheres of competence, the Union and the Member States shall cooperate with third countries and with the competent international organisations. The arrangements for Union cooperation may be the subject of agreements between the Union and the third parties concerned.*

*The previous subparagraph shall be without prejudice to Member States' competence to negotiate in international bodies and to conclude international agreements"*

relevant concerning EU environmental scope, however the choice of the legal basis is decided case by case<sup>123</sup>.

Article 191 TFEU sets the environmental objectives of the Union, which are: *"preserving , protecting and improving the quality of the environment; protecting human health; prudent and rational utilisation of natural resources; promoting measures at international level to deal with regional or worldwide environmental problems, and in particular combating climate change"*. The first objective is quite malleable and because of this it does not give a clear connotation of European environment policy; the second includes in the scope of the treaty not just the protection of society as a whole, but also of individuals or groups; the third provision refers to natural resources but does not clarify what they are; Principle 2 of the Stockholm Declaration gives some help by stating that *"natural resources of the earth including the air, water, land, flora and fauna and especially representative samples of natural ecosystems"*; the latter objective includes extraterritorial environmental powers which however are bound by international law.

The principles of European Environmental Policy are established by Article 191(2) TFEU and are: the precautionary principle; the principle that preventive action should be taken (the prevention principle); the principle that environmental damage should as a priority be rectified at source (the source principle) and the principle that the polluter should pay (the polluter pays principle). The Union moreover, *'shall aim'* at a high level of protection, taking into consideration the various situation across the Union.

The case law of the Court of Justice demonstrates that a high level of environmental protection is compatible with economic interests<sup>124</sup>. Furthermore the *'high level of protection'* provision emerges in the *'internal market'* provision Article 114(3) TFEU which states: *"The Commission, in its proposals envisaged in paragraph 1 concerning health, safety, environmental protection and consumer protection, will take as a base a high level of protection, taking account in particular of any new development based on scientific facts. Within*

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<sup>123</sup> Consolidated versions of the Treaty on European Union and the Treaty on the Functioning of the European Union 2012/C 326/01

<sup>124</sup> (Case C-343/09 Afton Chemical, Judgement of 8 July 2010)



*their respective powers, the European Parliament and the Council will also seek to achieve this objective"*

#### THE PRECAUTIONARY PRINCIPLE

The precautionary principle is the basis of EU environmental law 'since Maastricht'; it requires that in cases where there is a strong doubt but not scientific evidence on the environmental consequences of a certain activities, it is preferable to act before formal proofs are available. It is evident that it is an issue of risk-management, although deciding the level of risk considered as tolerable is a matter of political responsibility and *"shall be proportional, non-discriminatory in their application and consistent with similar measure already taken"*<sup>125</sup>. In any case 'available scientific and technical data' must be considered; this has besides been confirmed on Article 114(5) TFEU.

#### THE PREVENTION PRINCIPLE

It requires the immediate protection of the environment from the earliest stage in order to avoid that any damage may occur. It was stressed under the Third Environmental Action Programme<sup>126</sup> and was widely used by the Court of Justice to interpret the notion of 'waste' in the Waste Framework Directive<sup>127</sup>.

#### THE SOURCE PRINCIPLE

It is based on the *"principle that environmental damage should as a priority be rectified at its source"*<sup>128</sup>. Its scope was confirmed in the Walloon Waste case that discussed whether Wallon decision to reduce the importation of waste were discriminatory; the Court reaffirmed that waste should be managed as closer as possible to the place of production according to the proximity principle even though as of the case

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<sup>125</sup> (Jans & Vedder, 2012, p. 43)

<sup>126</sup> (OJ 1983 C 46/I)

<sup>127</sup> (Joined Cases C-418/97 and C-419/97 ARCO Chemie Nederland [2000] ECR I-4475 and Joined Cases C-175/98 and C-177/98 Lirussi and Bizzarro [1999] ECR-I-688i.

<sup>128</sup> (Jans & Vedder, 2012, p. 48)

Sydhavnens Sten & Grus<sup>129</sup> the source principle cannot be invoked to impose restrictions on exports of waste, at least for non-hazardous waste.

#### THE POLLUTER PAYS PRINCIPLE

The polluter-pays principle was firstly introduced<sup>130</sup> in the Treaty of 1987, despite it has been recognized at EU level since 1973 with the first European Environmental Action Programme that defined PPP as: “*costs of preventing and eliminating nuisances must be borne by the polluter*”<sup>131</sup>. A 1975 Council Recommendation<sup>132</sup> provided that the goal of the PPP is the reasonable utilization of natural resources, that has been confirmed by the following Environmental Action Programs; the Third one declared that the PPP incentivizes fewer polluting products and technologies, while the fifth foster cleaner production processes.<sup>133</sup>

In 1986 the PPP was acknowledged as a source for environmental policies in the Single European Act<sup>134</sup>, in particular Article 130r (d) stated that: “*Action by the Community relating to the environment shall be based on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source, and that the polluter should pay. Environmental protection requirements shall be a component of the Community's other policies*”.

It is interesting to note that its translation spans from the English version that claim "the polluter should pay" to other versions that admit that "the polluter pays" up to the German principle of causation.<sup>135</sup> Considering that any EU law and notion must be interpreted without recurring to national interpretations, it is difficult to assess first of all - who is the polluter, secondly, who must pay? All in all, these questions confirm the economic principle that is the base of the PPP and what emerged is that

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<sup>129</sup> (Case C-209/98 Sydhavnens Sten & Grus [2000] ECR I-3743)

<sup>130</sup> See: (Kramer, 2011)

<sup>131</sup> OJ C 112, 20.12.1973, pp. 1-2, Title 2, sub 5.

<sup>132</sup> Council Recommendation of 3 March 1975 regarding cost allocation and action by public authorities on environmental matters, OJ L 194, 25.07.1975, p.1.

<sup>133</sup> See: Lindhout, P. E., & Van den Broek, B. (2014). The Polluter Pays Principle: Guidelines for Cost Recovery and Burden Sharing in the Case Law of the European Court of Justice. *Utrecht Law Review*, 10(2)

<sup>134</sup> Single European Act, OJ L 169, 27.6.1987.

<sup>135</sup> (Kramer, 2011)

environmental damage costs shall not be supported by the community through taxes but by the direct responsible of the impairment. Traditionally the cleaning up of the environment has been seen a duty of public authorities, in particular in cases where it is impossible to identify the polluter, like water pollution or soil erosion.

In 1993 the EC strengthened its PPP commitment by imposing a strict liability regime that was aimed at making the polluter financially responsible for his damage. Under the directive (2004/35/CE) obligation can be imposed if: the polluter can be recognized, it is possible to assess the damage and it can be found a link between the damage and the polluter. Who is found to be responsible for polluting is asked to pay for bureaucratic costs, appraisal costs related to the damage but also aiming at preventing it, remedial tools. The money collected from fining must be directed to recover the situation and not to other expenses.

In Directive 2004/35<sup>136</sup> it is stated that if the polluter has not been identified it is up to Member States to recover the situation, however often that is not possible and therefore many contaminated places are not recovered. Directive 2004/35/CE sets a list<sup>137</sup> of activities subjected to strict liability.

This list has been appealed by critics because it does not include other dangerous activities or because it protects certain species or habitats. Moreover armed conflict, civil war, national defence, international security and natural disasters are not included in the directive that take into consideration just negligent polluters. In any

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<sup>136</sup> Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage

<sup>137</sup> Waste management operations

- All discharges into inland surface water
- Discharges into groundwater that require permits, authorisation or registration
- Discharges into surface water that require permits, authorisation or registration
- Water abstraction and impoundment
- Manufacture, use, storage, processing, filling, release into the environment and onsite transport of:
  - Dangerous substances
  - Dangerous preparations
  - Plant protection products
  - Biocidal products
- All transport of dangerous or polluting goods
- Operation of installations subject to authorisation
- Use, release, sale and transport of genetically modified micro-organisms
- Transboundary shipment of waste

case, this principle is not binding, in fact no European provision state who shall pay, but also if it was binding, it would have shown to be incompatible with environmental aid like the Structural Fund, LIFE + etc.<sup>138</sup>

*Cases where it is not possible to identify the polluter*<sup>139</sup>

It is difficult in certain situations to assess who is the polluter and therefore who is subjected to environmental liability. In this respect the jurisprudence of the European Court of Justice provides orientation. For instance, in its judgement of 4 March 2015<sup>140</sup>, it confirms that obligations on the owner who is not responsible have to be limited, in accordance with the European environmental principles established in Art. 191, para 2 TFEU. These principles are: the polluter pays principle (as implemented by Directive 2004/35/EC, on environmental liability, with regard to the prevention and remedying of environmental damage), the precautionary principle, the principles that preventive action should be taken, and that environmental damage should primarily be rectified at the source.<sup>141</sup> It is worth noting that in order to apply the PPP it is required an evident causal link between the contamination and the activities of individual operators. This has been confirmed in the Pontina Ambiente case<sup>142</sup> concerning the interpretation of Directive 1999/31<sup>143</sup> on the landfill of waste. The Court reaffirmed that the non-polluter (in this case the landfill operator) has not to support the cost of pollution, namely of waste disposal, that shall be borne by the holder of waste.

Member States are allowed to use presumptions to find causation between activities and pollution and environmental damage as of the ERG and others case<sup>144</sup> it emerges that public authorities “*must have plausible evidence capable of justifying its*

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<sup>138</sup> (Kramer, 2011)

<sup>139</sup> See (Lindhout & Van den Broek, 2014), <http://courtofjustice.blogspot.com/2010/03/case-c17208-pontina-ambiente-srl-v.html> and <http://courtofjustice.blogspot.com/2009/09/case-c25408-futura-immobiliare-srl.html> (viewed, January 23rd, 2019)

<sup>140</sup> C-534/13 Ministero dell'Ambiente e della Tutela del Territorio e del Mare and other v Fipa Group s.r.l., Tws Automation s.r.l. and Ivan s.r.l. (European Court of Justice 4 March 2015)

<sup>141</sup> Corriero, V. (2016). The Social-Environmental Function of Property and the EU Polluter Pays Principle: the Compatibility between Italian and European Law. *The Italian Law Journal* (2)

<sup>142</sup> Case C-172/08 Pontina Ambiente Srl v Regione Lazio

<sup>143</sup> Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste  
*OJ L 182, 16.7.1999, p. 1–19*

<sup>144</sup> Case C-378/08, ERG and Others, [2010] ECR I-0000

*presumption, such as the fact that the operator's installation is located close to the pollution found and that there is a correlation between the pollutants identified and the substances used by the operator in connection with his activities”.*

Another issue is that it can be impossible to determine the entity of environmental damage; according to the Court<sup>145</sup>, this can be estimated, provided that it is not disproportionate.

European environmental law is also based on general principles of European law.

#### PRINCIPLE OF CONFERRED POWERS

It is of relevant importance to choose the most appropriate legal basis when dealing with European environmental law as the main subject of the legislation can be either the *'internal market'* or the protection of the environment; in the first case the legal basis would be Article 114 TFEU, while in the latter Article 192 TFEU. After the Treaty of Amsterdam it does not exist anymore a different procedure between internal market and environmental legislation, therefore choosing for a legal basis is now easier.

Article 114 TFEU serves as a legal basis for those measures *'which have as their objective the establishment and functioning of the internal market'*. It is recognised by the Treaty that many environmental measures indeed contribute to the establishment of the internal market. Article 114(3) TFEU sets for the Commission to take as a base a high level of protection for its proposals on environmental protection; this means that environmental protection falls within the scope of Article 114, moreover the Court claimed that when it is possible to invoke Article 114 TFEU as a legal basis this does not mean that 'public health or consumer protection' reasons allow European law to be exempted from this legal basis.

In general Article 114 TFEU is applied to *"environmental products standards and for environmental measures which regulate conditions of production and remove appreciable distortions*

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<sup>145</sup> Case C-254/08, Futura Immobiliare srl Hotel Futura

*of competition in a particular industry*"<sup>146</sup>, in sum for the objective of establishing the functioning of the internal market. This has been confirmed by the Court of Justice in the TiO<sub>2</sub> case, referring to its judgement in Case 92/79<sup>147</sup>: "*Action intended to approximate national rules concerning production conditions in a given industrial sector with the aim of eliminating distortions of competition in that sector is conducive to the attainment of the internal market and thus falls within the scope of Article 100a, a provision which is particularly appropriate to the attainment of the internal market*".

Article 114 TFEU however, cannot be invoked as a legal basis when the objective of the realisation of the internal market is only incidental, for instance despite Article 4 of the Waste Framework Directive involved a certain harmonising effect, this proved to be not enough to apply Article 114.

Therefore choosing between Article 192 and 114 TFEU, as with any other legal basis, is done looking at the '*centre of gravity*' of the measure; the general rule is to choose a single legal basis, however certain measures can lay on both of them, Case C-178/03 offered the solution that if the legal basis do not contrast with one another and do not restrict the rights of the Parliament they can be implemented at the same time, provided that the Committee of the Regions has been consulted. Examples of a joint application of Article 114 and 192 TFEU are Directive 2006/66 on batteries and accumulators and waste batteries and Directive 2009/28 on the promotion of the use of energy from renewable sources<sup>148</sup>.

#### PRINCIPLE OF SUBSIDIARITY

Article 5 TEU reads: "*Under the principle of subsidiarity, in areas which do not fall within its exclusive competence, the Union shall act only if and in so far as the objectives of the proposed action cannot be sufficiently achieved by the Member States, either at central level or at regional and local level, but can rather, by reason of the scale or effects of the proposed action, be better achieved at Union level*". It emerges a negative (not sufficiently achieved by the Member States)

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<sup>146</sup> (Jans & Vedder, 2012, p. 75-76)

<sup>147</sup> (Case 92/79 Commission v. Italy [1980] ECR 1115)

<sup>148</sup> (OJ 2006 L 266/I and OJ 2009 L140/16)

and a positive criteria (better achieved by the Union) to describe the subsidiarity principle.

#### PRINCIPLE OF PROPORTIONALITY

Article 5 TEU states: *“Under the principle of proportionality, the content and form of Union action shall not exceed what is necessary to achieve the objectives of the Treaties”*. In accordance with this principle, in the field of environmental law the trend of framework legislation is now enshrined; a relevant example is the Waste Framework Directive. Proportionality requires a certain degree of flexibility in the Directives' provisions as it was concluded in Stanley<sup>149</sup>. This flexibility, however cannot be misused by Member States, moreover once they take more stringent measures according to Article 193 TFEU, than the one fixed by Union provisions, they cannot invoke the principle of proportionality.

#### EQUAL TREATMENT

The principle of equal treatment states that *“comparable situations must not be treated differently and different situations must not be treated in the same way unless such treatment is objectively justified”*<sup>150</sup>. In accordance to the Court of Justice a treatment is justified if *“it is based on an objective and reasonable criterion, that is, if the difference relates to a legally permitted aim pursued by the legislation in question, and it is proportionate to the aim pursued by the treatment”*.<sup>151</sup>

#### INTEGRATION PRINCIPLE

It is one of the main principles regarding environmental law and it is stated in Article 11 TFEU: *“Environmental protection requirements must be integrated into the definition and implementation of the Union's policies and activities, in particular with a view to promoting*

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<sup>149</sup> (Case C- 293/97 Standley [1999])

<sup>150</sup> (Jans & Vedder, 2012, p. 21)

<sup>151</sup> Idem 150

*sustainable development*"; giving a certain legal feature to the notion of sustainable development. This was confirmed in the Sixth Environmental Action Programme, that claims that *"integration of environmental concerns into other policies must be deepened in order to move towards sustainable development"*.<sup>152</sup>

This principle includes the integration of environmental policy objectives of Article 191(1) TFEU, but also those mentioned in Article 191(2) TFEU like the precautionary principle and the principle that preventive action should be taken; all in all the aim of the integration principle is to promote a *"general obligation on the European institutions to reach an integrated and balanced assessment of all relevant environmental aspects when adopting other policy"*, taking the least environmental detrimental decision. This principle means that it is no longer necessary to invoke any other legal basis when dealing with issues that see the opposition of environmental protection requirements and the functioning of the internal market. Considering that as of art. 11 and 7 TFEU all Union objectives lay at the same level, environmental aims cannot be seen as an apart policy field, but are seen in relation with other policies such as transport, energy and agriculture for instance.

The integration principle is also enshrined in the Charter of Fundamental Rights of the European Union<sup>153</sup>; article 37 of the Charter is indeed similar to Article 11 TFEU and it reads: *"A high level of environmental protection and the improvement of the quality of the environment must be integrated into the policies of the Union and ensured in accordance with the principle of sustainable development"*. After Lisbon the Charter acquired the same legal value of the Treaties, therefore its provision are binding on Union institutions and Member States, when they apply Union law.

Other sources of European Union environmental law are international conventions, so-called "mixed" conventions as competence delineated by those conventions are both covered by the EU and Member States; international conventions are relevant for European Union law only if its content has been transposed into a directive or

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<sup>152</sup> (Decision 1600/2002 laying down the Sixth Community Environment Action Programme, OJ 2002 L. 242. Cf. also Communication from the Commission, A partnership for integration: a strategy for integrating the environment into EU policies, COM (1998) 333 and Commission working document, Integrating environmental considerations into other policy areas - a stocktaking of the Cardiff process, COM (2004) 394.)

<sup>153</sup> Charter of Fundamental Rights of the European Union OJ C 326, 26.10.2012, p. 391–407



regulation. If not, Member States can adhere to an international convention at their discretion.

## SUSTAINABLE DEVELOPMENT

The concept of sustainable development was firstly introduced by the Amsterdam Treaty<sup>154</sup> in 1999<sup>155</sup> although neither art. 11 TFEU nor art. 3 TEU define it. This idea derive from the already mentioned 1987 World Commission on Environment and Development presided by Gro Brundtland from Norway.

Environmental concerns were included in the treaties with the introduction of the environmental integration principle in 1983<sup>156</sup>, and despite the lack of a legal basis this interpretation made possible the adoption of environmental measures.

What now is known as sustainable development then was recognized as *"the idea of economic development not being an aim in itself but involving social and environmental aspects"*.<sup>157</sup>

In 1992 the EC Treaty established the duty to a sustainable development<sup>158</sup>; the Lisbon European Council in 2000 sets for the European Union to become in a 10-year period *"the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion"*<sup>159</sup>; in 2001 the Gotenborg European Council implemented environmental issues to the Lisbon

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<sup>154</sup> Treaty of Amsterdam amending the Treaty on European Union, the Treaties establishing the European Communities and certain related acts - Final Act  
*OJ C 340, 10.11.1997, p. 115*

<sup>155</sup> (Kramer, 2011)

<sup>156</sup> Resolution of 7 February 1983, OJ 1983, C 46, 1–16

<sup>157</sup> Douma, W. T. (2017). The Promotion of Sustainable Development through EU trade instruments. *European Business Law Review*(2), 197-216, p. 200.

<sup>158</sup> Treaty establishing the European Community (Nice consolidated version). *Official Journal C 340* , 10/11/1997 P. 0173 Article 2:

*The Community shall have as its task, by establishing a common market and an economic and monetary union and by implementing common policies or activities referred to in Articles 3 and 4, to promote throughout the Community a harmonious, balanced and sustainable development of economic activities, a high level of employment and of social protection, equality between men and women, sustainable and non-inflationary growth, a high degree of competitiveness and convergence of economic performance, a high level of protection and improvement of the quality of the environment, the raising of the standard of living and quality of life, and economic and social cohesion and solidarity among Member States.*

<sup>159</sup> Lisbon European Council 23 and 24 MARCH 2000 Presidency Conclusions, I(A)5.

Treaty, which also involved provisions on sustainable development in EU trade policy. In June 2006 the European Council approved a strategy on sustainable development and seven objectives were set: climate change and clean technologies, sustainable transport, sustainable consumption and production, conservation and management of natural resources, public health, social inclusion, demography and migration, and global poverty and the challenges of sustainable development.

Article 2 of the 1992 TEU fixed the objective of *“economic and social progress as well as a high level of employment and the achievement of balanced and sustainable development”*.

Article 3(3) TEU<sup>160</sup> establishes that the Union: *“shall work for the sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress, and a high level of protection and improvement of the quality of the environment”*

The TEU, moreover requires the Union to pursue sustainable development to the benefit of developing countries,<sup>161</sup> in particular concerning the EU relationship with developing countries, there are agreements that take into consideration the principle of sustainable development, in particular the 2000 Cotonou Agreement Article 9 of this agreement provides that: *“Respect for all human rights and fundamental freedoms, including respect for fundamental social rights, democracy based on the rule of law and transparent and accountable governance are an integral part of sustainable development”*<sup>162</sup>.

The Charter of Fundamental Rights of the European Union<sup>163</sup> fixes *“high level of environmental protection and the improvement of the quality of the environment must be integrated*

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<sup>160</sup> Treaty of Lisbon amending the Treaty on European Union and the Treaty establishing the European Community, Lisbon, 13 December 2007. Document C:2007:306:TOC

<sup>161</sup> Article 21(2) t regulates the Union's external action under Title V TEU requires the Union to pursue those actions in order to:

*“(d) foster the sustainable economic, social and environmental development of developing countries, with the primary aim of eradicating poverty;*

*(e) encourage the integration of all countries into the world economy, including through the progressive abolition of restrictions on international trade;*

*(f) help develop international measures to preserve and improve the quality of the environment and the sustainable management of global natural resources, in order to ensure sustainable development;*

*(g) assist populations, countries and regions confronting natural or man-made disasters; and*

*(h) promote an international system based on stronger multilateral cooperation and good global governance.”*

<sup>162</sup> Partnership agreement 2000/483/EC — between ACP countries and the EU

<sup>163</sup> Charter of Fundamental Rights of the European Union *OJ C 326, 26.10.2012, p. 391–407*

*into the policies of the Union and ensured in accordance with the principle of sustainable development” (Art. 37).*

Sustainable development is present also in secondary legislation, however it is not significantly described.

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## B. EUROPEAN POLICY ON WASTE<sup>164</sup>

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Concerns and awareness on the scarcity of natural resources were considered at policy level by the European Economic Community since the 70s, with the 1975 Waste Framework Directive. The current European Policy on Waste consists in a Framework Legislation composed by the above-mentioned Waste Framework Directive, that is the ‘mother Directive’, followed by minor documents and directives in the field of Waste Treatment Operations and Waste Streams. The Framework Legislation is besides formed by the Hazardous Waste Directive and Waste Shipment Regulation, as of Figure 1. These pieces of legislation converged in the Circular Economy Package of 2018.

Although the Circular Economy Package comprises a wider array of sectors, the focus will be on Directive (EU) 2018/851 and Directive (EU) 2018/849, that amended the latest versions of respectively Directive 2008/98/EC on Waste (Waste Framework Directive), Directives 2000/53/EC on end-of-life vehicles, 2006/66/EC on batteries and accumulators and waste batteries and accumulators, and 2012/19/EU on waste electrical and electronic equipment, because they are the most relevant to the topic of this thesis, that is closed-loop supply chains.

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<sup>164</sup>See: Kingston, S., Heyvaert, V., & Čavoški, A. (2017). *European Environmental Law*. Cambridge University Press

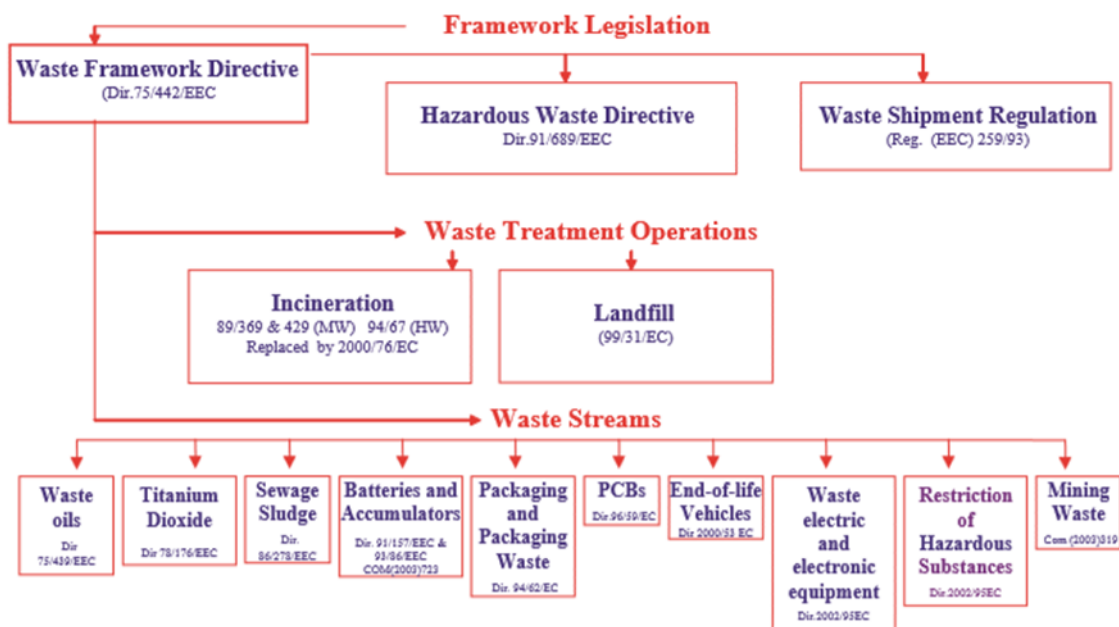


FIGURE 1 EU WASTE FRAMEWORK LEGISLATION<sup>165</sup>

### THE WASTE FRAMEWORK DIRECTIVE<sup>166</sup>

The Waste Framework Directive was adopted in 2008 (2008 WFD); it incorporated the previous Waste Framework Directive of 2006 (which amended the one of 1975), the Directive on Waste Oils and the Directive on Hazardous Waste, providing a framework with regard to waste and it is in line with the EU’s environmental objectives as of Article 191(2) TFEU. Its ambition is to move the EU closer to a ‘*recycling society*’, seeking to avoid waste generation and to use waste as resource, aiming to unhook economic development from impact to the environment, with the more general objective of waste prevention.

The 2008 WFD imposed on Member States programming, monitoring and supervisory functions. Member States are also required to promote the environmentally friendly design of products. In order to foster the polluter pays principle and the waste hierarchy, the Directive inserted the concept of extended producer responsibility; according to Article 8 WFD “*any natural or legal person who*

<sup>165</sup> From [http://ec.europa.eu/environment/waste/pdf/story\\_book.pdf](http://ec.europa.eu/environment/waste/pdf/story_book.pdf), p. 10

<sup>166</sup> Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives. Text with EEA relevance, OJ 2008 L 312/3

*professionally develops, manufactures, processes, treats, sells or imports products (producer of the product) must carry out their treatment themselves or must employ someone else to carry out this task*<sup>167</sup>. The WFD mentioned the self-sufficiency and proximity principles (Article 16), that means that Member States must integrate a network of waste disposal facilities throughout the territory.

The definitions of waste, by-product, end-of-waste and the waste hierarchy are the most interesting aspects according to the author.

### CONCEPT OF WASTE

Waste is an autonomous concept of EU law<sup>168</sup>; it is defined by Article 3 WFD as “*any substance or object the holder discards or intends to discard or is required to discard*<sup>169</sup>” which defines the waste holder as “*the waste producer or the natural or legal person who is in possession of the waste*<sup>170</sup>”; according to Advocate General Kokott the holder cannot be confused with the owner, rather with the person who possess and dispose of the waste.

Despite the Court of Justice was asked to interpret the concept of waste, it never gave a clear criteria for its determination but rather the Advocate General Jacobs admitted its imprecise character.<sup>171</sup> The economic nature of waste was finally acknowledged by the Court in the Walloon case.<sup>172</sup>

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<sup>167</sup> idem

<sup>168</sup> Opinion of AG Cruz Villalon ECLI: EU:C:2013:324, para. 42

<sup>169</sup> Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives. Text with EEA relevance, OJ 2008 L 312/3

<sup>170</sup> Opinion of the AG Kokott ECLI:EU:C:2004:67, para. 56. “*the actual physical control of an object, but does not presuppose ownership or a legal power of disposal...the notion of possession (must therefore) go beyond the narrow sense of the word to include a legal power of disposal over the waste, in addition to actual (direct or indirect) physical control*”

<sup>171</sup> Opinion of AG Jacobs ECLI:EU:C:1996:399, para. 56

<sup>172</sup> Case C-2/90 Commission v. Belgium ECLI:EU:C:1992:310, para 28. “*waste has an intrinsic commercial value... whether recyclable or not, is to be regarded as “goods” the movement of which, in accordance with Article 28 of the Treaty, must in principle not be prevented*”

## CONCEPT OF BY-PRODUCT

By-products are entities coming from “*the final outcome of the production process and which the producer wants to discard*”<sup>173</sup>. For this reason, they must be distinguished from products. Article 5 WFD establishes the requirements<sup>174</sup> for production residues to not be considered as waste (and therefore to be judged as by-products): its further use in industrial processes must be a real possibility; substances or objects do not need to be re-processed to enter again in the industrial cycle (washing and drying and modification of size or shape do not go against the provision of the article); the substance or objects come from the same industrial process; a new use respects the WFD objective to reduce the ‘*negative effects of the generation and management of waste on human health and the environment*’.

## CONCEPT OF END-OF-WASTE

The definition of end-of-waste applies when waste has passed through a recovery activity and can be processed into a new product. Article 6 WFD lays the requirements for waste to respect the end-of-waste condition.<sup>175</sup> The first two

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<sup>173</sup>79, p. 502

<sup>174</sup>Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives. Article 5.

(a) further use of the substance or object is certain;  
(b) the substance or object can be used directly without any further processing other than normal industrial practice;  
(c) the substance or object is produced as an integral part of a production process; and  
(d) further use is lawful, i.e. the substance or object fulfils all relevant product, environmental and health protection requirements for the specific use and will not lead to overall adverse environmental or human health impacts.

<sup>175</sup> Idem. Article 6.

(a) the substance or object is commonly used for specific purposes;  
(b) a market or demand exists for such a substance or object;  
(c) the substance or object fulfils the technical requirements for the specific purposes and meets the existing legislation and standards applicable to products; and  
(d) the use of the substance or object will not lead to overall adverse environmental or human health impacts.

requirements aim at avoiding any disadvantageous effect on recycled markets. There is besides attention on the effects on human or environmental health, which require an integrated approach through the entire supply chain, *'including input materials; processes and techniques; quality control procedures; product quality; and potential applications or uses'*.<sup>176</sup>

#### WASTE HIERARCHY<sup>177</sup>

This concept was encouraged by the Directive 2006/12/EC on waste. It is laid out by Article 4 that requires the waste hierarchy to be considered such as a *"priority order in waste prevention and management legislation and policy"*. It consists in order of importance: prevention, preparing for re-use, recycling, other recovery and disposal. Prevention means first of all avoiding/limiting waste production; it is strictly linked with better products manufacturing and the promotion of a responsible demand by consumers who should be educated to buy eco-designed products. Re-use stands for using products and components repeatedly for the same purpose they were projected for. Recycling consists in a process that reduces materials to end up in landfills and consequently maximizes the value of the same. Other recovery, in particular energy recovery is linked to a certain extent to incineration; modern waste incineration factories produce electricity, steam and heatings for buildings, as well as fuel for industries. However this process has to be strictly monitored, in fact in case of a poor management of the plants hazardous emissions can be produced. Disposal is associated with landfilling, the worst way to dispose of waste; organic waste deposited in landfills produces methane while non-organic waste may release chemicals and heavy metals, in sum waste disposed in landfills contaminates local groundwater, soil and surface water. For this reason the European legislation has obliged MS first of all to reduce the amount of organic waste in landfills, and at the

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<sup>176</sup> End-of-waste Criteria, Methodology and Case Studies Report, at. 18

<sup>177</sup> See Directive 2008/98/EC

same time promoted the closure of low-performing landfills, however this process has been different among Member States. (European Commission, 2010)

When applied it should be taken into consideration the measure that has the weaker impact on the environment, moreover Member States according to Article 4 Directive 2008/98/EC must consider the *"principles of precaution and sustainability, technical feasibility and economic viability, protection of resources as well as the overall environmental human health, economic and social impacts"*.

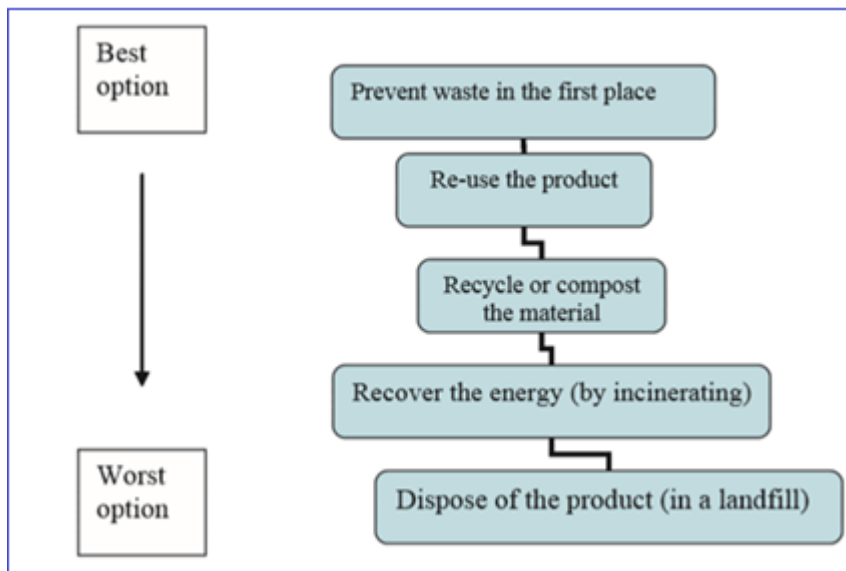


FIGURE 2 THE WASTE HIERARCHY<sup>178</sup>

## DIRECTIVE 2006/66/EC ON BATTERIES AND ACCUMULATORS AND WASTE BATTERIES AND ACCUMULATORS<sup>179</sup>

The Batteries Directive was adopted in 2006 and has the objectives to reduce the environmental impact of the batteries and accumulators and to harmonise the requirements concerning the heavy metal content and labelling of batteries and accumulators so to ensure the smooth functioning of the internal market and avoid distortion of competition within the Community.<sup>180</sup> In particular it limits the

<sup>178</sup> From [http://ec.europa.eu/environment/waste/pdf/story\\_book.pdf](http://ec.europa.eu/environment/waste/pdf/story_book.pdf), p.9

<sup>179</sup> Directive 2006/66/EC of the European Parliament and of the Council on batteries and accumulators and waste batteries and accumulators

<sup>180</sup> Directive 2006/66/EC . Recital 1



amount of cadmium and mercury; at the same time it regulates the collection, treatment, recycling and disposal of waste batteries and accumulators.

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#### DIRECTIVE 2000/53/EC ON END-OF-LIFE VEHICLES (ELVS)<sup>181</sup>

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ELVs Directive aims at reducing waste coming from vehicles as well as the increase of reuse, recycling and other forms of recovery of end-of-life vehicles and their components to reduce the disposal of waste (Article 1). The Directive involves the entire supply chain in this operation; manufacturers are required to limit the amount of hazardous substances in their new vehicles and design and produce their vehicles in order to make it easier their reuse and recycling (Article 4(1)). Member States moreover are requested to guarantee that economic operators make use of material coding standards in order to make easier the dismantling process (Article 8) and publish progress reports (Article 9(2)).

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#### DIRECTIVE 2012/19/EU ON WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE)<sup>182</sup>

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WEEEs were initially regulated by the WEEE Directive of 2002<sup>183</sup> and the Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment.<sup>184</sup> It envisions the framework for the collection, treatment and recovery of waste electrical and electronic equipment as well introducing extended producer responsibility, to be pursued through eco-design and imposing manufacturers to finance for collection schemes. It was amended in 2012 to correct some aspects like unnecessary administrative costs, inadequate waste

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<sup>181</sup> Directive [2000/53/EC](#) of the European Parliament and of the Council of 18 September 2000 on end-of-life vehicles

<sup>182</sup> Directive 2012/19/EU, OJ 2012 L 197/38

<sup>183</sup> OJ 2003 L 37

<sup>184</sup> Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment. OJ L37/19

collection and recycling rates. Its objective as of Article 1 is to support sustainable production and consumption patterns in fulfillment of the waste hierarchy.<sup>185</sup>

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### C. REASONS FOR THE CIRCULAR ECONOMY PACKAGE IN THE EUROPEAN UNION

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*'We cannot compete on wage costs; we cannot compete on cheap natural resources as other parts of the world could. But with resource efficiency, leadership in green technologies and modern waste management, we can build a competitive edge, generate new business opportunities and create jobs'*<sup>186</sup>

This quotation made by the First Vice-President of the European Commission at the presentation of the Circular Economy (CE) package in 2015 makes clear the reason for a policy package on the CE: first and foremost economic competitiveness on the global market as well as green objectives.<sup>187</sup>In 2017 the European Commission<sup>188</sup> identified a List of 27 Critical Raw Materials for the EU (CRMs): Antimony, Baryte, Beryllium, Bismuth, Borate, Cobalt, Coking Coal, Fluorspar, Gallium, Germanium, Hafnium, Helium, HREEs, Indium, LREEs, Magnesium, Natural graphite, Natural rubber, Niobium, PGMs, Phosphate rock, Phosphorus, Scandium, Silicon metal, Tantalum, Tungsten, Vanadium.

The European industry, according to the European Commission, is characterised by the predominance of the manufacturing and refining industry which necessitate

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<sup>185</sup> Article 1

This Directive lays down measures to protect the environment and human health by preventing or reducing the adverse impacts of the generation and management of waste from electrical and electronic equipment (WEEE) and by reducing overall impacts of resource use and improving the efficiency of such use in accordance with Articles 1 and 4 of Directive 2008/98/EC, thereby contributing to sustainable development.

<sup>186</sup>“Introductory remarks by FVP Timmermans at the Commission's Press Conference on 02/12/2015 - college readout (Security package and Circular Economy package)” from [https://ec.europa.eu/commission/commissioners/2014-2019/timmermans/announcements/introductory-remarks-fvp-timmermans-commissions-press-conference-02122015-college-readout-security\\_en](https://ec.europa.eu/commission/commissioners/2014-2019/timmermans/announcements/introductory-remarks-fvp-timmermans-commissions-press-conference-02122015-college-readout-security_en). Lastly Viewed January 25, 2019

<sup>187</sup> McDowall, W. et al., 2017. Circular Economy Policies in China and Europe. *Journal of Industrial Ecology*, 21(3), pp. 651-660. P.653

<sup>188</sup> List of Critical Raw Material for the EU, COM (2017)490

CRMs in order to support their activity. However, the most of the CRMs originate from non-European countries as shown in Figure 3.

That is the reason why the CE mantra *'Reduce, Reuse, Recycle'* is recurrent: recovering precious materials from product at their end-of-life (secondary raw materials) diminishes the dependence of European industries from external suppliers; besides the recycling industry requires an important (and often qualified) workforce<sup>189</sup>, thus 'boosting' the European job market.

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<sup>189</sup> European Commission, 2015a. *Communication from the Commission. Closing the loop - An EU action plan for the Circular Economy.*, s.l.: s.n.

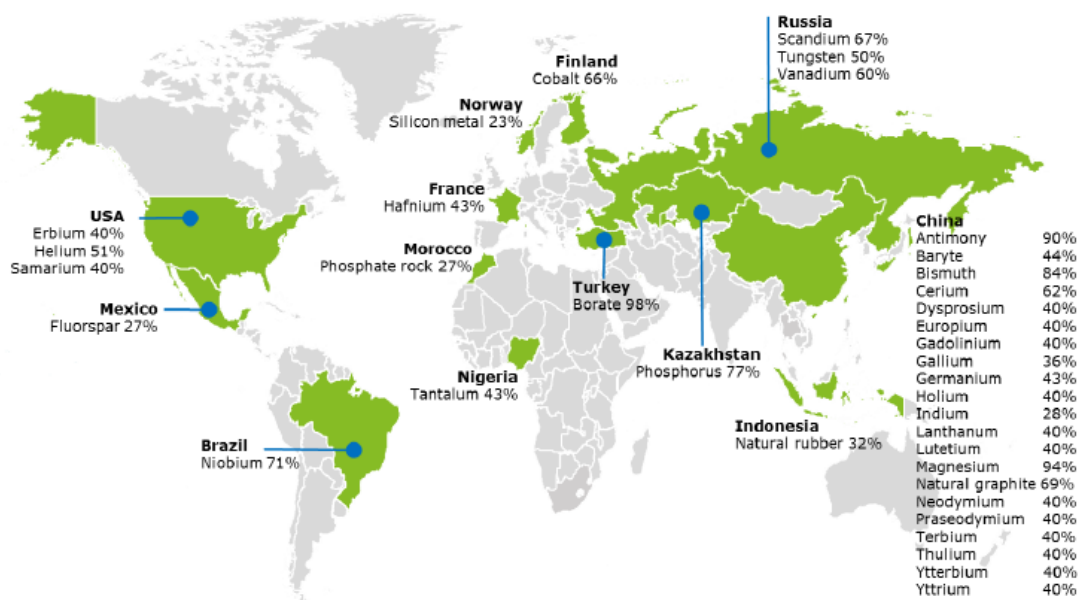


FIGURE 3 CONTRIBUTION OF COUNTRIES ACCOUNTING FOR LARGEST SHARE OF SUPPLY OF PRIMARY CRM TO THE EU, AVERAGE FROM 2010-2014 (EUROPEAN COMMISSION, 2018D)

## THE CIRCULAR ECONOMY STRATEGY

In order to promote the shift towards a CE, (and so guaranteeing Europe's supply of raw materials) the European Commission, represented by the former Commissioner for the Environment Janez Potočnik, in 2014 negotiated the so-called '*First Package on the CE*' combined with the Communication '*Towards a CE: a zero waste programme for Europe*'<sup>190</sup>. As it was not deemed sufficiently in line with the targets on growth and occupation set by the Juncker Agenda, it was withdrawn by the Commission on the 25th february 2015.<sup>191</sup>

<sup>190</sup> Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Towards a circular economy: A zero waste programme for Europe  
/\* COM/2014/0398 final/2 \*/

<sup>191</sup> See: De Leonardis, F., 2017. Economia circolare: saggio su suoi tre diversi aspetti giuridici. Verso uno stato circolare?. *Diritto Amministrativo*, 1(2017), pp. 163-207.

In December 2015 the Commission presented a new plan for the CE, with the aim of expand the EU's economy by creating new jobs and saving resources in order to not be subjected to their price-volatility and to respect the Earth.<sup>192</sup>

The 'CE Package' of 2014 was replaced by the Communication, 'Closing the loop – An EU Action Plan for the CE'<sup>193</sup>. The Communication consists in an Action Plan and a set of legislative proposals amending Directive 2008/98/EC<sup>194</sup> on waste, Directive 1999/31/EC on the landfill of waste<sup>195</sup>, Directive 94/62/EC on packaging and packaging waste<sup>196</sup>, Directives 2000/53/EC on end-of-life vehicles<sup>197</sup>, 2006/66/EC on batteries and accumulators and waste batteries and accumulators<sup>198</sup>, and 2012/19/EU<sup>199</sup> on waste electrical and electronic equipment.

#### COMMUNICATION (2015) 614 FINAL: 'CLOSING THE LOOP – AN EU ACTION PLAN FOR THE CE'

The Action Plan is composed by 54 measures aiming at integrating the above mentioned policy areas so to '*close the loop*'; it complements the legislative proposals by setting an action timeline and a monitoring framework.

The new Action Plan reveals to be more concrete comparing with the one of 2014 and has the ambition of 'closing the loop'; it looks at the entire life cycle of products, from production to consumption and in particular it stresses the relevance of the recyclability of the materials used and consequently the market for secondary raw materials.<sup>200</sup>

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<sup>192</sup> 189, p.2

<sup>193</sup> Communication from the Commission to the European Parliament, the Council, , the European Economic and Social Committee and the Committee of the Regions Closing the loop - An EU action plan for the Circular Economy COM/2015/0614 final

<sup>194</sup> Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (Text with EEA relevance)  
*OJ L 312, 22.11.2008, p. 3–30*

<sup>195</sup> Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste  
*OJ L 182, 16.7.1999, p. 1–19*

<sup>196</sup> European Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste

<sup>197</sup> 181

<sup>198</sup> 180

<sup>199</sup> 182

<sup>200</sup> See: D'Addezio, M., 2017. Transizione verso un'economia circolare: diritto per l'agricoltura e coordinate costituzionali. Prime riflessioni. *Rivista di diritto agrario*, Issue 1, pp. 85-116.

The EU Action Plan is implemented through key actions<sup>201</sup>: by action line (20 key actions), by priority sectors (16 key actions) and by cross-cutting issues (8 key actions). These key actions imply a monitoring and assessing activity for the period 2016-2018. The action lines touch the entire products' supply chain: raw materials, product design, production, waste management. The priority sectors are: biomass and bio-based products, plastics, food waste, critical raw materials and construction and demolition, while transversal actions imply the development of a monitoring framework for the Circular Economy<sup>202</sup> even though according to McDowall and colleagues the plan does not explicitly take into consideration indicators for the CE. It is evident therefore that the European strategy aspire to involve the whole industrial sector (even though it still influences the other sectors, in particular agriculture) and not just regulating on a product by product basis like in the United States.

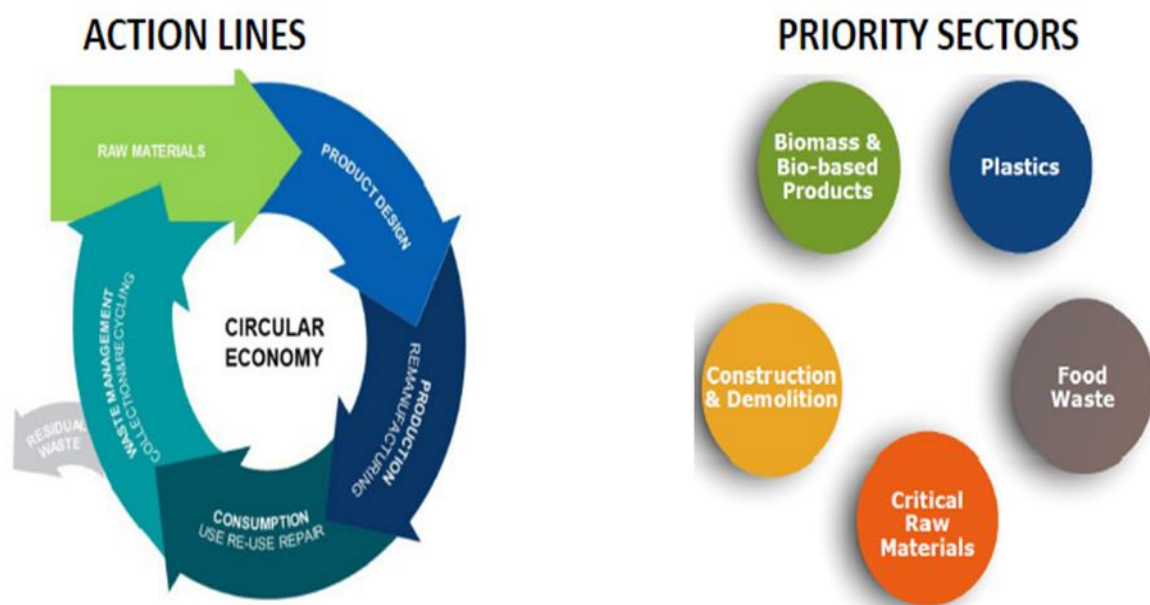


FIGURE 4 ACTION LINES AND PRIORITY SECTORS OF THE CE PACKAGE FROM (MOLINA MARTINEZ, 2018)

As already mentioned, the main objective of the Commission is the preservation of precious resources for European manufacture. The Commission is analysing the

<sup>201</sup> Molina Martinez, J. (2018, April 27). Hacia una economía circular como elemento clave para un desarrollo regional inteligente y sostenible. Zaragoza, Spain.

<sup>202</sup> (Molina Martinez, 2018)

major challenges to that and it is uncertain how to detect the level of purity of secondary raw materials. This is why it proposes to launch EU wide standards for secondary raw materials but also encourages market-driven initiatives that create demand of secondary raw materials. The Commission besides promotes non-toxic material cycles and tracking on chemicals so to facilitate the uptake of secondary raw materials. The Commission is working to facilitate the cross-border movement of secondary raw materials, through the improvement of data and research on raw materials flows. At the same time, it asks for better reporting on waste shipment so to limit cross-border circulation of waste. Another topic of concern is the scarcity of water and the Commission is taking a series of actions to support the reuse of wastewater.

As mentioned before with regards to production, the Commission calls for a better design, that facilitates *'repair, upgrade or remanufacture'*<sup>203</sup>, but also can save resources; here the design phase is critical and the Commission puts the accent on eco-design; Eco-design working plan 2016-2019<sup>204</sup> promotes durability, reparability, upgradeability, design for disassembly, recyclability, reusability and energy efficiency. At present time eco-design is a tricky issue as the market does not openly support it. Under Ecodesign Directive the Commission mandates *'product design and requirements to make products easier and safer to dismantle, reuse and recycle'*.<sup>205</sup>

The Commission promotes best practices in industrial sectors as the *'best available technique reference documents'* (BREFs) that should guide MS when issuing permits for industrial installations, but also will help SMEs to put in practice an increased resource efficiency with the foundation of the European Resource Efficiency Excellence Centre, but also stresses the importance of promoting innovative industrial processes like industrial symbiosis, which involves waste or by-products for one industry to be actively used by other manufacturers.

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<sup>203</sup> European Commission, 2015b. *Press release: Closing the loop: Commission adopts ambitious new Circular Economy Package to boost competitiveness, create jobs and generate sustainable growth*, p.3.189

<sup>204</sup> COMMUNICATION FROM THE COMMISSION Ecodesign Working Plan 2016-2019 COM/2016/0773 final

<sup>205</sup> 203, p.4

As regards consumption the Commission is aware that often environmentally-friendly products/sources or green indicators are not reliable, therefore it is working to make them more trustworthy. The Commission besides recognizes that prices should reflect environmental costs and demands MS to use economic instruments like taxation. The European Commission also stresses that legal guarantees existing in the EU should be improved and plans upcoming proposals for online sales of goods; in particular it aims to detect practices such as planned obsolescence. Other actions will embrace the reduction of household waste but also the support of innovative forms of consumption like the sharing economy and Green Public Procurement (GPP) will be encouraged.

The European Commission fosters Waste Management by stressing the relevance of the Waste Hierarchy so to *'deliver the best overall environmental outcome'*<sup>206</sup>. In order to improve recycling quality, the Commission proposes basic requirements on transparency and cost-efficiency. It recalls that obstacles to better recycling rates are 'administrative capacity, a lack of investment in separate collection and recycling infrastructure and insufficient use of economic instruments (e.g. landfill charges or pay-as-you throw schemes); the creation of overcapacities in infrastructure to treat residual (including mixed) waste'.

According to Muratori, the Action Plan is a good starting point towards this new paradigm is to be considered more as a "statement of intent" rather than an "Action Plan" in fact its objectives resemble the ones of the UN Agenda 2030. Despite they are clear, it is less clear which instruments are going to be used in order to assess if this abstract economic theory such as the Circular Economy can be concretely transposed into acts and facts. Moreover, although the Commission claims that in Europe institutions, citizens and industries support the Circular Economy, this is not always the case in real life situations.<sup>207</sup>

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<sup>206</sup> 203, p.8

<sup>207</sup> See: Muratori, A. (2018). Al rush finale il pacchetto di direttive per gestire i rifiuti secondo l'economia circolare. *Ambiente e Sviluppo (commento alla normativa)*



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#### D. 2018 CIRCULAR ECONOMY PACKAGE: ADOPTION OF LEGISLATIVE PROPOSALS ON WASTE

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The legislative proposals contained in the Communication by the European Commission ‘Closing the loop – An EU Action Plan for the CE’ of 2015, have been submitted during the following two years to the procedure for the adoption of Directives. The action plan was debated at the Competitiveness Council on 29 February 2016 and at the Environment Council on 4 March 2016. The Council adopted conclusions on the plan in the Environment Council of 20 June 2016, taking in consideration the positions of both the councils.<sup>208</sup> In March 2017, the Parliament approved the proposals on amendments by MEP and rapporteur of the waste package Simona Bonafè. In June 2017 the European Council approved its amended text.

A further phase, called ‘Trilogue’,<sup>209</sup> delivered a new agreement on the CE in December 2017.<sup>210</sup>

On 14th June 2018 the Circular Economy Package was finally ratified and became law on 4th July. The CE Package contains the following Directives:

- Directive (EU) 2018/851<sup>211</sup> of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste
- Directive (EU) 2018/849<sup>212</sup> of the European Parliament and of the Council of 30 May 2018 amending Directives 2000/53/EC on end-of-life vehicles,

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<sup>208</sup> <http://www.consilium.europa.eu/en/press/press-releases/2017/12/18/council-and-parliament-reach-provisional-agreement-on-new-eu-waste-rules/> viewed July 23rd, 2018

<sup>209</sup> ‘Informal tripartite meetings attended by representatives of the European Parliament, the Council and the Commission’ ([http://ec.europa.eu/codecision/stepbystep/glossary\\_en.htm](http://ec.europa.eu/codecision/stepbystep/glossary_en.htm)) viewed July 23rd, 2018

<sup>210</sup> See: Fondazione per lo Sviluppo Sostenibile. (2018). “*Le modifiche alla direttiva rifiuti. Circular Economy. I principali contenuti dell'accordo a tre (Consiglio, Commissione e Parlamento) del 17/18 Dicembre 2017*”. From [https://www.fondazionevilupposostenibile.org/wp-content/uploads/dlm\\_uploads/2018/02/Le-modifiche-alle-direttive-rifiuti-circular-economy\\_I-principali-contenuti-dellaccordo-a-tre.pdf](https://www.fondazionevilupposostenibile.org/wp-content/uploads/dlm_uploads/2018/02/Le-modifiche-alle-direttive-rifiuti-circular-economy_I-principali-contenuti-dellaccordo-a-tre.pdf)

<sup>211</sup> Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste (Text with EEA relevance) PE/11/2018/REV/2 OJ L 150, 14.6.2018, p. 109–140

2006/66/EC on batteries and accumulators and waste batteries and accumulators, and 2012/19/EU on waste electrical and electronic equipment

- Directive (EU) 2018/850<sup>213</sup> of the European Parliament and of the Council of 30 May 2018 amending Directive 1999/31/EC on the landfill of waste
- Directive (EU) 2018/852<sup>214</sup> of the European Parliament and of the Council of 30 May 2018 amending Directive 94/62/EC on packaging and packaging waste

Here we will focus on Directive 2018/851 and Directive 2018/849, as their content is connected with the analysis of the following chapter on Closed-Loop Supply Chains.

According to Simona Bonafè, negotiating the CE Package was complex because two different positions emerged; from one side MS with “*a thermo-valorisation over-capacity were more willing to low targets of landfill conferral, but less available to ambitious recycling rates*”, from the other side, emerged MS “*less flexible both on landfills (lower targets of landfill conferral) and to higher recycling rates*”<sup>215</sup>. Besides, the Commission and the Parliament had different objectives with regard recycling rates.<sup>216</sup> Despite this, the initial position of the Commission was kept, although with a five-years extension.

Ms. Bonafè stresses however, that the CE is not just recycling but comprises an efficient waste cycle and a more sustainable economy. The CE package besides has an ethical and social impact as, for the first time in Europe it regulates Food Waste; Marine Litter is also part of the package. The most relevant changes were made to recycling rates and EPR<sup>217</sup>.

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<sup>212</sup> Directive (EU) 2018/849 of the European Parliament and of the Council of 30 May 2018 amending Directives 2000/53/EC on end-of-life vehicles, 2006/66/EC on batteries and accumulators and waste batteries and accumulators, and 2012/19/EU on waste electrical and electronic equipment (Text with EEA relevance) PE/9/2018/REV/1 OJ L 150, 14.6.2018, p. 93–99

<sup>213</sup> Directive (EU) 2018/850 of the European Parliament and of the Council of 30 May 2018 amending Directive 1999/31/EC on the landfill of waste (Text with EEA relevance) PE/10/2018/REV/2 OJ L 150, 14.6.2018, p. 100–108

<sup>214</sup> Directive (EU) 2018/852 of the European Parliament and of the Council of 30 May 2018 amending Directive 94/62/EC on packaging and packaging waste (Text with EEA relevance) PE/12/2018/REV/2 OJ L 150, 14.6.2018, p. 141–154

<sup>215</sup><https://www.youtube.com/watch?v=iXp4c42ssOg> viewed July 23rd, 2018

<sup>216</sup> Muratori, A., 2018. Al rush finale il pacchetto di direttive per gestire i rifiuti secondo l'economia circolare. *Ambiente e Sviluppo (commento alla normativa)* 3, 141

<sup>217</sup> (Ronchi, 2018).

All the amended Directive lay on the Principle of Subsidiarity and Proportionality<sup>218</sup>, but also on Article 192 TFEU on the Environment and on Article 114 TFEU on the protection of the internal market<sup>219</sup>.

#### DIRECTIVE (EU) 2018/851 ON WASTE

Directive 2018/851 amended Directive 2008/98/EC; its legal basis is Article 294<sup>220</sup> TFEU and Art. 192 par 1.

Directive 2018/851/EU represents the starting point of the package; it is composed by 67 introductory paragraphs and it consists in four articles; the first one describes the innovations and modifications on waste legislation, in order to promote "*the transition to a circular economy and for guaranteeing the Union's long-term competitiveness*"; according to Muratori<sup>221</sup>, this represents a mere declaration of intents, whose results have to be verified, based on the potential and real effectiveness of the new norms. The following ones briefly determine the deadlines for implementation by the Member States (Article 2), by 5 July 2020 and the date for the Directive to enter into force, that as already mentioned was the 4th July 2018 (Article 3) and the recipient of the Directive that obviously are the Member States (Article 4).

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<sup>218</sup> "Since the objectives of this Directive... can rather, by reason of the scale and effects of the measures, be better achieved at Union level, the Union may adopt measures, in accordance with the principle of subsidiarity as set out in Article 5 of the Treaty on European Union. In accordance with the principle of proportionality, as set out in that Article, this Directive does not go beyond what is necessary in order to achieve those objectives". See Paragraph 64 Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste (Text with EEA relevance) PE/11/2018/REV/2 OJ L 150, 14.6.2018, p. 109–140

<sup>219</sup> Jans, H. H., & Vedder, H. H. (2012). *European Environmental Law. After Lisbon. 4th Edition*. Groningen: Europa Law Publishing.

<sup>220</sup> On ordinary legislative procedure: <http://www.lisbon-treaty.org/wcm/the-lisbon-treaty/treaty-on-the-functioning-of-the-european-union-and-comments/part-6-institutional-and-financial-provisions/title-1-institutional-provisions/chapter-2-legal-acts-of-the-union-adoption-procedures-and-other-provisions/section-2-procedures-for-the-adoption-of-acts-and-other-provisions/614-article-294.html>

<sup>221</sup> See: Muratori, A. (2018). La riformata direttiva quadro dei rifiuti: a beneficio dell'economia circolare, novità sui sottoprodotti e sulla perdita della qualifica di rifiuto. *Ambiente e sviluppo, (commento alla normativa)*, 8-9, 519 and Muratori, A. (2018). Al rush finale il pacchetto di direttive per gestire i rifiuti secondo l'economia circolare. *Ambiente e Sviluppo (commento alla normativa)*, 3, 141

The main character of the package is the notion of waste<sup>222</sup> and as a consequence the definition of waste holder results to be very stringent; the only products or substances that do not undergo the provisions of the Directive are listed by Article 2 (Exclusions) and those that respect the conditions of by-products and end-of-waste.

By-products<sup>223</sup> (Article 5) have acquired an important status within the new Directive, from a mere possibility to a real outcome of the production process; here Member States are empowered to take measures aimed at the recognition of by-products. According to Muratori, the fact that Member States are empowered to establish those criteria, subjects industrial practice to the jurisprudence provisions, that often are quite restrictive. The Commission however, can adopt acts in order to guarantee a uniform application of the provision in the Union, for instance by promoting best-practices such as industrial symbiosis: this model has been promoted by Directive 2018/851/EU and represents a tangible application of the Circular Economy. Muratori claims that Article 6 on end-of-waste is still lacking as a consequence of the delegation to Member States to establish criteria made by European Organs.

The role of the waste hierarchy is strengthened with a focus on '*preparing for re-use*', '*recycling*' and '*re-use*'. More stringent requirements on re-use and recycling have been set for 2025, 2030 and 2035. The waste hierarchy priorities are described along the Directive; at Article 9 (replaced by Directive 2018/851) there is an indication of the measures that must be taken by Member States to prevent waste generation, article 10 instead illustrate that Member States must take action in order for waste to go through preparing for re-use, recycling or other recovery operations.

Article 11, point c(ii) of the amended Directive sets new targets for re-using and recycling:

- By 2025: the weight of municipal waste that goes through re-using and recycling shall be increased of at least 55%;

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<sup>222</sup> Article 3, paragraph 1 of Directive 2008/98/EC defines waste as "*any substance or object which the holder discards or intends or is required to discard*"

<sup>223</sup> Defined as : "*a result from a production process that was not the primary aim of that process. Unlike waste, it must be able to be used afterwards*". <sup>223</sup>

- By 2030: the weight of municipal waste that goes through re-using and recycling shall be increased of at least 60%;
- By 2035: the weight of municipal waste that goes through re-using and recycling shall be increased of at least 65%;

This article sets moreover a 5-years derogation for low-performing Member States that is those who recycled less than 20% or landfilled more than 60% in 2013 according to the Joint Questionnaire of the OECD and Eurostat.

Waste management should therefore be pursued in a way that does not cause any damage to water, oil, air, soil, plants or animals according to Article 13 (2008's Directive) on the protection of human health and the environment.

Collateral instruments (regulatory, economic and organisational) related to the package have been introduced, for example the measures on waste prevention, that it is essential to point out, is the main objective of both the 2018 Package on the Circular Economy and of the Waste Framework Directive of 2008.

#### ENDORSEMENT OF THE POLLUTER PAYS PRINCIPLE

It is considered as a guiding principle and it is mentioned in Article 14 of both the original and the amended Directives: the latter extends the principle to include the costs of infrastructure and its operations in the definition of waste management to be supported by the original or current waste producer/holder.

According to the EPR Club<sup>224</sup>, Extended Producer Responsibility is an application of the Polluter Pays Principle.

#### LAUNCHING OF THE CONCEPT OF EXTENDED PRODUCER RESPONSIBILITY (EPR)

It was firstly introduced by the Directive of 2008; paragraph 27 defines it as *"one of the means to support the design and production of goods which take into full account and facilitate the efficient use of resources during their whole life-cycle including the repair, re-use, disassembly and*

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<sup>224</sup> [http://www.eprclub.eu/about\\_epr\\_Club/What\\_is\\_EPR](http://www.eprclub.eu/about_epr_Club/What_is_EPR), viewed 11 July 2018

*recycling without compromising the free circulation of goods on the internal market"*; the amending Directive at paragraph 14 adds that it is an instrument used by Member States to impose manufacturers the financial and organizational responsibility of their activity. Paragraph 21 of Directive 2018/951 while stressing the importance of EPR as a tool for an efficient waste management, recognizes that schemes may differ from a Member State to another, however it demands that minimum targets are fixed. Paragraph 24 states that if municipal authorities provide EPR services to producers, this must be done in a cost-efficient way.

In the older Directive, Extended Producer Responsibility is regulated under Article 8 that establishes that the so-called '*producer of the product*' has extended producer responsibility; this means that the manufacturer is both financially and physically responsible for the disposal of returned products and of its waste. Such measures may include an acceptance of returned products and of the waste that remains after those products have been used, as well as the subsequent management of the waste and financial responsibility for such activities. These measures may include the obligation to provide publicly available information as to the extent to which the product is re-usable and recyclable.'

These measures provide an incentive to manufacturers to design products '*in order to reduce their environmental impacts and the generation of waste*', moreover '*may encourage the development, production and marketing of products that are suitable for multiple use, that are technically durable and that are, after having become waste, suitable for proper and safe recovery and environmentally compatible disposal.*' Member States besides, can foster measures aiming at eco-design.

Paragraph 5 has been added and requires the Commission to arrange an interchange of information between Member States and actors implicated in EPR, but also it must publish guidelines on the topic.

Member States, besides, when putting in practice EPR must consider if it is technically and economically possible and at the same time respectful for the environment and human health while not impeding the internal market.

Article 8a is added in the new legislation and sets general minimum requirements for EPR schemes, in particular paragraph 1 it sets the role of Member States in defining role and responsibilities of the actors involved in EPR, to fix waste management goals, to introduce a reporting system of the products circulating on the market and relative waste treatment and to equally treat all producers. Paragraph 2 requires that all the actors involved in EPR have enough information on waste activities and facilities. Paragraph 3 sets the Member States obligations towards producers of products, for example by providing adequate waste collection systems. Paragraph 4, point a) requires Member States to make sure that 'producer of products' contribute to extended producer responsibility costs related to: separation - transport and treatment of waste, information, data gathering; at point b) it demands that in case of collective EPR individual environmental performance of producers are taken into account; point c) sets targets; in particular it demands that producers sustain at least 80% of the costs of EPR schemes established after 4 July 2018, whilst at least 50% for schemes anterior to 4 July 2018. Paragraph 5 requires Member States to arrange a monitoring and enforcement framework and paragraph 6 to set up a dialogue among the actors involved in the implementation of EPR schemes.

A recurring feature of the new Directive, is the reference to the free movement of goods inside the internal market; paragraph 20 of the 2018 Directive for instance requires that despite products must be developed in a way that makes them repeatedly usable, durable and repairable this must not undermine the functioning of the internal market but also paragraph 27 ask the Commission to develop harmonised criteria on EPR in order to ensure coherence in the internal market.

Paragraph 50 besides sets that in case of export of waste for preparing for re-use and recycling to third countries, Member States should verify this is made in an environmentally sound manner, respecting human health and environmental protection standards, that must be equivalent to the European ones, in order to avoid all those situation of dumping to (developing) countries where environmental requirements are less stringent.

All in all the new text, is clear and corrects the lacks of the previous legislation<sup>225</sup>.

#### DIRECTIVE (EU) 2018/849

Directive (EU) 2018/849<sup>226</sup> amended on the 30th of May 2018 three different Directives: Directives 2000/53/EC<sup>227</sup> on end-of-life vehicles, 2006/66/EC<sup>228</sup> on batteries and accumulators and waste batteries and accumulators, and 2012/19/EU<sup>229</sup> on waste electrical and electronic equipment.

For the purposes of this writing the three Directives will be analyzed one by one, taking into consideration the amendments.

#### DIRECTIVE 2000/53/EC ON END-OF-LIFE VEHICLES (ELV DIRECTIVE)

Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles was adopted under a co-decision procedure and signed by both the European Parliament (EP) and Council's Presidents on 18th September 2000. The Proposal for the Directive was adopted first by the Commission on the 9th July 1997<sup>230</sup>.

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<sup>225</sup> (Muratori, 2018)

<sup>226</sup> Directive (EU) 2018/849 of the European Parliament and of the Council of 30 May 2018 amending Directives 2000/53/EC on end-of-life vehicles, 2006/66/EC on batteries and accumulators and waste batteries and accumulators, and 2012/19/EU on waste electrical and electronic equipment (Text with EEA relevance) PE/9/2018/REV/1 *OJ L 150*, 14.6.2018, p. 93–99

<sup>227</sup> Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles - Commission Statements  
*OJ L 269*, 21.10.2000, p. 34–43

<sup>228</sup> Directive 2006/66/EC of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC (Text with EEA relevance)

*OJ L 266*, 26.9.2006, p. 1–14

<sup>229</sup> Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE) Text with EEA relevance

*OJ L 197*, 24.7.2012, p. 38–71

<sup>230</sup> Further information about the negotiations (<https://eur-lex.europa.eu/legal-content/EN/HIS/?uri=CELEX:32000L0053>).



On the 30th May 2018 this Directive was amended by Directive (EU) 2018/849 whose legal basis is Article 192 TFEU.

This Directive aims at the harmonisation of the Member States' standards with regard to end-of-life vehicles; the reasons for this arrangement is first of all to provide a further protection of the environment, to be pursued through recycling and recovery of end-of-life vehicles- secondly, the objective is to protect the internal market and avoid any distortion.

The Directive lays on the principle of subsidiarity, on the polluter-pays-principle, on the precautionary and preventive principles (attained through waste-avoiding, namely re-using and recycling) and takes into account the waste hierarchy. The Waste Hierarchy is stressed by Article 4 on Prevention, which requires Member States to restrain the use of hazardous substances (lead, mercury, cadmium and hexavalent chromium) in vehicles, to facilitate recycling (particularly of plastics), to promote eco-design and the use of recycled materials ; Article 7 on Reuse and recovery asks Member States to support the re-use of components. The amended version requires ELVs to be compliant with the Waste Hierarchy as of Article 4 of Directive 2008/98/EC.

In order to ensure that consistent results are achieved in a relative short-term the European Commission has set - as of Article 5 on collection - that producers, importing wholesalers and sellers must offer collecting services for ELVs and when possible using parts from repaired passenger cars; according to the same Article the treatment costs are in general borne by the producers. During the treatment process hazardous materials and components are taken away and divided, paying attention to a potential reuse, recovery or recycling of the waste.

The Commission<sup>231</sup>, according to the new directive is empowered to adopt delegated acts in order to modify Annex II on *Materials and components exempt from*

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<sup>231</sup> See: Edizioni Ambiente. (2018). *Il Pacchetto Economia Circolare. Con la versione coordinata della direttiva Rifiuti*. (R. N. Ambiente, A cura di) Milano: Edizioni Ambiente.

*Article 4(2)(a)*<sup>232</sup> to adapt to technic and scientific progress, it can impose minimum requirements for the certificate of destruction on ELVs, the same applies for ELVs treating. The Commission has besides to monitor that Member States respect reuse and recovery objectives, taking into consideration the state-of-the-art of the sector; Member States have to communicate on a year-basis to the Commission national data on reuse and recovery as of Article 7(2) of Directive 2000/53/EC.

Article 7 (2) objectives are that *“new vehicles are reusable and/or recyclable to a minimum of 85% by weight per vehicle and reusable and/or recoverable to a minimum of 95% by weight per vehicle”*. The Commission commits to promote the preparation of standards (through international forums, article 8(2) amended Directive) in order to achieve that vehicles are designed and produced in a way that makes targets easier to reach.

Article 9 requires Member States to provide data accompanied by a quality check report every three years; the Commission must publish a report on the results of the Member States. The same Article requires Member States to demand the main economic actors to provide information on how they do design vehicles and components, the environmental treatment they reserve to their products and the progress achieved on recycling and recovery.

#### DIRECTIVE 2006/66/EC ON BATTERIES AND ACCUMULATORS AND WASTE BATTERIES AND ACCUMULATORS (BATTERIES DIRECTIVE)

A proposal for a Directive of the European Parliament and of the Council on batteries and accumulators and spent batteries and accumulators was first adopted by the Commission on the 24th November 2003 and transmitted to both the Council and the Parliament the very same day. The Presidents of the Parliament and of the Council signed the Directive on 6th September 2006.<sup>233</sup>

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<sup>232</sup> Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of-life vehicles - Commission Statements  
*Official Journal L 269*, 21/10/2000 P. 0034 - 0043

<sup>233</sup> For an overview of the negotiations: <https://eur-lex.europa.eu/legal-content/en/HIS/?uri=CELEX:32006L0066>

As of Article 1 of the Directive, its objective is to impose rules on the business of batteries and accumulators in particular to prohibit those containing toxic substances; it aims at setting regulations on the collection, treatment, recycling and disposal of waste batteries and accumulators (the Directive is directed at all type of batteries and accumulators as of Article 2) and it aspires to increase the environmental performances of batteries and accumulators during their entire life cycle. Those objectives are explained in detail by Article 4, 5 and 6 of the Directive. In particular Article 4 requires that all batteries and accumulators containing more than 0.0005% of mercury by weight and 0.002% of cadmium by weight are banned, except for emergency and alarm systems, medical equipment or cordless power tools. Article 5 demands Member States to support research and development and promote the selling of products having fewer hazardous components or better being made with alternatives to mercury, cadmium and lead.

Article 6 instead imposed Member States to retire from the market those products that do not respect the Directive's requirements.

The core of the Directive is to achieve a better recycling of batteries and accumulators to be obtained through appropriate collection schemes (Article 8) that are accessible to the population and that do not charge the end-user. Article 10 sets collection targets: (a) 25% by 26 September 2012, b) 45% by 26 September 2016 and imposes MS to report every 18 months about their collection rate, moreover they have to show how they did obtain the data to determine the collection rate.

The Directive allows Member States to make use of economic instruments (Article 9) in order to support the collection of waste, namely by adopting differential tax rates, provided that they notify it to the Commission. Article 15 sets - treating and recycling are permitted outside the EU as long as this respects the requirements of the Directive. Article 19 requires Member States to make sure that all economic actors and public officials take part in the collection, treatment and recycling schemes. The Directive impose manufacturers to share information with end-users: article 20 requires that consumers are informed of the consequences on the environment and human health of the substances contained in batteries and

accumulators; the value of not disposing of expired batteries and accumulators as unsorted municipal waste; collection and recycling facilities available to them; their function in the recycling process; the crossed-out wheeled bin. Article 21 about it requires that labelling is visible.

There is reference to the Waste Hierarchy also in this Directive, in particular the Amended version - at Article 22a, requires that Member States use those economic instruments as those shown in Annex IVa to Directive 2008/98/EC or others. Article 11 requires manufacturers to design products so that batteries and accumulators are easier to remove or to provide instructions on safely removing them. Article 12 requires MS to make sure that producers or third parties provide for treatment and recycling complying with the EU legislation and only if there is no alternative collected portable batteries or accumulators containing cadmium, mercury or lead can be landfilled or stored underground; in any case MS must notify it to the Commission. This Directive besides demands batteries to be removed on WEEE equipment. As of Article 13 Member States have to promote the development of recycling technologies respectful of the environment. According to Article 14, batteries and accumulators shall not be disposed in landfills or incinerators.

Member States shall also make sure that batteries and accumulators are treated according to the best techniques available; treatment moreover must take into account the removal of all fluids and acids.

EPR principle emerges also in this Directive, in particular in Articles 16. Article 16 in fact demands the producers (or third parties) to finance the costs connected to collection, treatment and recycling, but also those related to informing the end-user; however this cost must not be shown separately to them, according to paragraph 4.

Relevant changes<sup>234</sup> made by the new Directive are made to the timing for Member States to send information to the Commission with regard to collection targets, treatment and recycling (Article 3 and 5 of the original Directive) that switched from

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<sup>234</sup> See: Edizioni Ambiente. (2018). *Il Pacchetto Economia Circolare. Con la versione coordinata della direttiva Rifiuti*. (R. N. Ambiente, A cura di) Milano: Edizioni Ambiente.

6 months to 18 months, moreover Article 22 on National Implementation Reports has been eliminated; now Member States do not have to fill any report on the implementation of the Directive.

Article 22-bis has been added and imposes Member States to adopt measures in order to foster the implementation of the waste hierarchy.

## DIRECTIVE 2012/19/EU DIRECTIVE ON WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT (WEEE)

The 2012/19/EU Directive on waste electrical and electronic equipment came into force to replace the original WEEE Directive (2002/96/EC) of 2003; the reason of this refresh is that the previous Directive was deemed to produce useless administrative costs, besides it demonstrated to not be adequate to fulfill the set health and environmental targets.

The Proposal for a Directive on WEEE was firstly adopted by the Commission in 2008 under a co-decision procedure; the Directive was finally signed by the President of the European Parliament and of the Council in 2012<sup>235</sup> and its legal basis is the already-mentioned Article 192(1) TFEU.

The principles influencing this Directive are the precautionary principle, the principle of preventive action, the principle that environmental damage must be restored, sustainable development and the polluter pays principle. These principles are in accordance with the objectives of the Union, namely: the reduction of the disposal of waste, an efficient use of the resources, recovering of secondary raw material and enhancement of environmental performance along the supply chain.

According to Article 1 the directive *"lays down measures to protect the environment and human health by preventing or reducing the adverse impacts of the generation and management of waste from electrical and electronic equipment (WEEE) and by reducing overall impacts of resource use and improving the efficiency of such use in accordance with Articles 1 and 4 of Directive 2008/98/EC, thereby contributing to sustainable development"*.

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<sup>235</sup> Information on the procedure: <https://eur-lex.europa.eu/legal-content/EN/HIS/?uri=CELEX:32012L0019>

Therefore this Directive applies to all kind of electrical and electronic appliances, whose classification can be found in Annex I of the same.

The Directive mainly regulates the collection and treatment of electrical and electronic equipment (EEE), in particular Article 5 asks MS to apply policies aiming at reducing the disposal of WEEE as unsorted municipal waste and to improve separate collection; Article 6 impose MS to make sure that products are treated before they have been disposed and that collection and transport must assure the proper conditions for optimal following operations. Article 7 instead sets collection rates from 2016: 45% of the total weight of WEEE as a percentage of the products sold in the previous three years; in the period from 2016 to 2019 this percentage should increase gradually, while from 2019 onward it should reach 85%. Article 8 impose WEEE to be properly treated - that is they have to be prepared for re-use; recovery and recycling must include the removal of all fluids contained in the appliances. This article besides requires that recovery is done following the best available techniques, while the Commission is bound to ask the European standardisation organisations to create standards for the treatment.

EPR is underlined in this Directive with regard to the financing of WEEE from both private households and other than private households. The former is made clear by Article 12 that impose producers to bear the costs for the disposal of WEEEs from household to waste facilities free of charge for end-user. The article allows the producers to choose both for an individual or collective scheme. To assure legal certainty and equality (to prevent potential dumpers) producers are obliged to offer a guarantee that can be both the participation of the manufacturer to a collecting scheme or in alternative a recycling insurance or a blocked bank account. The article by the way, regulates also the so-called '*historical waste*', requiring its cost to be supported by all the producers present on the market in proportion to their share.

With regard to shipment of WEEE for disposal in third countries, according to Article 10, exporters must prove that this takes form in a way equivalent to

European procedures. Member States have the duty to set the rules on penalties when this Directive is infringed; they must be according to Article 22 effective, proportionate and dissuasive. MS have also to proceed with inspections and monitoring in order to make sure that this Directive is properly implemented. The amended version of the Directive inserted Article 16a, requiring Member States to use economic tools to promote the application of the waste hierarchy (as indicated in Annex IV a of Directive 2008/98/EC). The Commission, besides reserves the right to make any amendment to update the Directive to scientific and technical developments.

An important aspect to the Directive is the information provided to users: according to Article 14, for example, producers may be required to show buyers the costs of collection, treatment and disposal of their products, while Member State shall make sure that users are aware about the requirement to not dispose of WEEE as unsorted municipal waste, but also the facilities that are more conveniently located, their role in re-using, recovering and recycling of WEEE but also the potential effects on the environment and their health as a consequence of the hazardous components of WEEEs.

As of Article 15 also treatment facilities shall receive by the manufacturer's information (free of charge) on the preparation for re-use and treatment of WEEEs. Article 16 of the older Directive is replaced by Article 3 on '*Registration, information and reporting*' and eliminates the duty for a three-year report on the implementation of the Directive; it was added that Member States have to send to the Commission a yearly report on the quantity and categories of EEEs present on their national market and every 18 months a report on quality control; the Commission will re-examine this data and publish a relation on that. Article 16-bis is added and it is aimed at fostering the waste hierarchy as of new Annex IV-bis to the directive 2008/98/EC.

The Directive requires also that producers are registered by Member States, moreover according to Article 17 producers shall be established in the country in

which they deal their products, otherwise they should appoint an authorised representative. Information should also flow between public authorities responsible for the implementation of the Directive.

Article 19(1) is substituted and it provides for the Commission to adopt delegated acts in order to update it to scientific and technical progress.

## GAPS IN THE CE PACKAGE

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The Circular Economy, because of its covering different sectors, requires the joint effort of a variety of competences; those skills should be coordinated by a neutral body, namely the European Commission, however considering the complexity of this project, the above-described Directives present some gaps. A further reason for the sub-optimal implementation of the CE Package can be explained by the fact that the Circular Economy is a concept that has not been so far totally understood by the Legislator, who for this reason delivers not totally clear rules. In this section will be provided two considerations coming from the Academia and one from the industrial sector on potential areas for improvement.

Despite the European Commission recognizes the urgency for implementing Circular Economic policies, according to Stahel<sup>236</sup> it does not give any solutions nor indications; the author argues that the main challenges that the European Union, as a group of industrialised countries, should address are in particular the necessity to implement sufficiency strategies to cope with a growing lack of natural resources and to look for alternative business models to apply to the 21st century's saturated markets.

Both according to Fise Assoambiente - Fise Unire and Leonidas the Directives lack of clear definitions: mandatory terms should be imposed on the concept of product

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<sup>236</sup> Stahel, W. R. (2013). Policy for material efficiency—sustainable taxation as a departure from the throwaway society. *Philos Trans R Soc Lond A: Math Phys Eng Sci.* , A 371: 20110567.(<http://dx.doi.org/10.1098/rsta.2011.0567>).



lifetime, reparability and recyclability. The main reason for this is in order to prevent manufacturers to make difficult the access to spare parts or repairing information.<sup>237</sup> Going beyond durability, legal matters emerge with regard to remanufacturing, particularly with regard to the identity of the remanufacturer, for both reason of legal compliance with EU norms and intellectual property rights, in fact remanufacturers do not want to be associated with producers because this implies their being economically responsible for instance of collection and recycling of waste products.

Despite the most EU legislation is concentrated on recycling, it should strengthen secondary raw materials markets, namely by implementing policies that address waste up-scaling; this means that new ways other than incineration and low quality recycling should be pursued in order to obtain cleaner and more sustainable recycling process and outputs. With regard to this aspect it emerges the issue of design for recycling; according to Finnveden et al. 2013, this must be made legally binding for companies.

Another issue of concern is the implementation of the internal market; even though a monitoring system has been introduced, it is important to make sure to prevent any difference from a Member State to the other, in order to avoid a competitive advantage for those MS not complying fully with the norms. It is also a fact that the Union imports from third countries, which may have lower standards, in particular with regard to eco-design rules therefore more stringent criteria should be imposed on imports.

According to Leonidas the most EU legislation regulates end-of-life products with a focus on waste management and recycling, while policies regulating distribution and consumption are fewer. At this respect, in accordance with Stahel remarks, the European Union should impose sustainable taxation, that is: excluding renewable resources (human labour is included in this classification) from taxation, to be compensated by non-renewable resources. Particularly, value preservation activities

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<sup>237</sup> Fise Assoambiente, Fise Unire. (2016). *Pacchetto Circular Economy Documento di considerazioni e proposte associative*. Roma and Leonidas, M. (2018). Advancing to a Circular Economy: three essential ingredients for a comprehensive policy mix. *Sustainability Science*, 13(8), 861-878.

like reuse, repair and remanufacturing should not bear VAT and at the same time institutions should be more reasonable when giving carbon credits, in fact existing protocols, like the Kyoto one, based on a linear philosophy, show a huge contradiction, namely *'first pollute, then reduce pollution to receive carbon credits!'*<sup>238</sup>. A further institutional incongruity is represented by Governments and taxpayers supporting in 2010, as of a study by the OECD<sup>239</sup> and the International Energy Agency half a trillion US dollars subsidising the production and consumption of fossil fuels.

#### FUNDING THE CIRCULAR ECONOMY<sup>240</sup>

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The Circular Economy Package is funded through projects supported by the European Commission and the European Investment Bank (EIB).

The projects promoted by the European Commission are the Cohesion Policy, COSME, LIFE and other structural funds for waste management.

Cohesion policy is the main EU's investment policy with over 350 billion euros for the 2014-2020 budgetary period and it consists in the European Regional Development Fund (ERDF), the Cohesion Fund (CF), the European Social Fund (ESF), the European Agricultural Fund for Rural Development (EAFRD) and the European Maritime and Fisheries Fund (EMFF); these funds jointly form the European Structural and Investment (ESI) Funds<sup>241</sup>. The ESI directs job creation, business competitiveness, economic growth and sustainable development; in sum it is aimed at obtaining economic and social cohesion throughout Europe, which is defined in the 1986 Single European Act <sup>242</sup>as *“reducing disparities between the various regions and the backwardness of the least-favoured regions”*, while the Lisbon Treaty remarks

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<sup>238</sup> (Stahel, 2013, p. 15)

<sup>239</sup> OECD. 2011 Fossil fuel subsidies study. See <http://www.oecd.org/iea-oecd-ffss>.

<sup>240</sup> See: European Commission. (2016). *Cohesion Policy Support for the Circular Economy*. European Investment Bank. (2015). *Access-to-finance conditions for Projects supporting Circular Economy*. EIB

<sup>241</sup> <[http://ec.europa.eu/regional\\_policy/en/faq/#1](http://ec.europa.eu/regional_policy/en/faq/#1)> . Viewed 14th november 2018

<sup>242</sup> Single European Act  
*OJ L 169, 29.6.1987, p. 1–28*

the idea of an *'economic, social and territorial cohesion'*. Cohesion Policy Fund has 11 priorities and cuts horizontally the circular economy; in particular it provides support to: more recycling, better waste management, resource and energy efficiency, fostering the bio-economy, new solutions for product design, novel business models and new green jobs. Investments supported by the Cohesion Policy funds are especially directed to municipalities' necessities, while programmes are managed by Member States.

COSME is an European programme for the period 2014-2020 for the Competitiveness of Enterprises and SMEs whose objectives are: facilitating access to finance, supporting internationalisation and access to markets, creating an environment favourable to competitiveness and encouraging an entrepreneurial culture.<sup>243</sup> With regard to its funding function COSME has been developed in order to facilitate the access to finance for SMEs, particularly through its Loan Guarantee Facility, designed to provide guarantees and counter-guarantees to financial institutions, and the Equity Facility for Growth, shaped in order to support SMEs with risk capital during their expansion and growth.

LIFE funds demonstration projects in line with the EU Circular Economy Package (European Union, 2017). The current programming period (2014-2020) is focused on the five priority sectors fixed by the Circular Economy Action Plan that are: plastics, critical raw materials (CRMs), food waste, biomass and bio-based products, and construction and demolition waste (CDW); efforts are particularly directed to plastics and CDW sectors. LIFE supports a variety of projects, in particular related to the circular economy, over 700 since 1992<sup>244</sup>. Relevant examples for the aim of this thesis are in the field of product design and production processes, for instance investments in creating networks of companies sharing resources and by-products –

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<sup>243</sup> <http://ec.europa.eu/DocsRoom/documents/9783>. COSME Europe's programmes for SMEs. Viewed 14th november 2018.

<sup>244</sup> See: European Union. (2017). *Life and the Circular Economy*. Luxembourg Publications Office of the European Union

in the field of waste management: *‘information campaigns, take-back schemes, new recommendations for manufacturers and recyclers, the development of innovative techniques for the recovery of critical materials, and the creation of new economically viable markets for recovered materials’*<sup>245</sup> and in the promotion of a market for secondary raw materials.

According to the provision of Article 309 TFEU the EIB can offer loans or guarantees to *“projects for modernising or converting undertakings or for developing fresh activities called for by the establishment or functioning of the internal market”*. The EIB can finance CE projects devoted to: environment and sustainable communities, innovation and skills, support to small and medium enterprises (SMEs).

Programs funded by the EIB include:

- COSME Loan Guarantee Facility: an instrument for SMEs that do not comply with the requirements of the InnovFin SME Guarantee.
- InnovFin SME Guarantee: a tool for innovative SMEs.
- InnovFin MidCap Growth Facility (InnovFin MGF): a debt instrument for innovative MidCaps;
- InnovFin MidCap Guarantee Facility (InnovFin MCG): a guarantee facility for innovative MidCaps;
- InnovFin Large Projects: a debt tool for innovative projects between EUR 50 - 600 million and that is more risk tolerant comparing to other instruments;
- InnovFin Energy Demo Projects: an ad hoc debt instrument for experimental innovative renewable energy projects;

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<sup>245</sup> European Union (2017), p. 11

- EFSI: a project initiated under the Investment Plan for Europe characterised by its flexibility in comparison with the above programs and that is directed to businesses of all sizes.

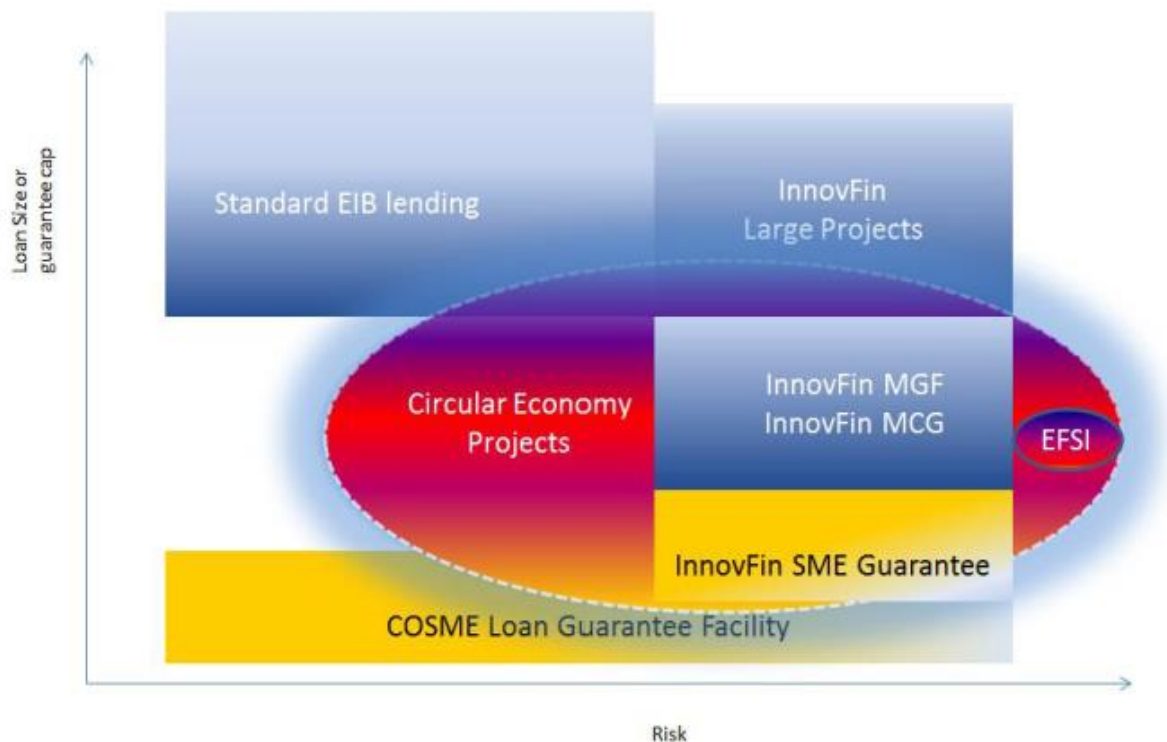


FIGURE 2 ILLUSTRATION OF (PRELIMINARY) CE FINANCIAL PRODUCT GAP ANALYSIS, FROM (EUROPEAN INVESTMENT BANK, 2015)

The above diagram depicts how CE projects could take advantage of the just-described instruments. A further instrument (not included in the diagram because of its variability) is the European Investment Fund (EIF), which is still part of the EIB Group and that supports venture capital funds, growth funds and mezzanine funds for SMEs

InnovFin funds are designed to promote technological innovation, in particular so as to be eligible for InnovFin MCG or InnovFin MGF a company must be: fast growing; innovative or be an 'R&I driven enterprise'; producing or developing innovative product, processes and/or services and that from the business plan emerges a potential failure.

A lack of this program is indeed the fact that it does not support non-technological innovation; in order to make it compatible with the Horizon 2020<sup>246</sup> Regulation it is desirable that InnovFin's eligibility criteria included also the 'business risk' along the life cycle of a company, for instance in case industrial symbiosis when it is necessary to update or modify the current facilities.

Non-innovative companies however can apply to EFSI funds, an instrument designed by both the EIB Group and the European Commission. Paragraph 13 of the Preamble of EFSI Regulation<sup>247</sup> states that: *“at the same time, the EFSI should be able to support environmentally sound projects and benefit industries and technologies with high growth potential and contribute to the transformation into a green, sustainable and resource-efficient economy”*.

*“By overcoming the Union's current investment difficulties and reducing regional disparities, the EFSI should seek to contribute to strengthening the Union's competitiveness, research and innovation potential, economic, social and territorial cohesion, and to support an energy and resource-efficient transition, including infrastructure transition, towards a sustainable, renewable-based circular economy”*.<sup>248</sup>

EFSI is an option therefore for those companies requiring loans under EUR 25 million and involving an higher risk level than standard loans.

Apart from the above depicted financing programs, considering that each project has a different degree of risk it is also possible for CE programs to be financed also through grants, equity, crowd funding.

Another option, developed by the EC, the EIB Group and the National Promotional Banks (NPBs) are multilateral platforms, for instance the European Energy Efficiency Fund (EEEF) or the European Progress Microfinance Fund

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<sup>246</sup> Horizon 2020 is the main EU Research and Innovation Programme, aiming at 'securing Europe's global competitiveness'. <http://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020> Viewed 1st December 2018

<sup>247</sup> Official Journal of the European Union, L 169, 1 July 2015

<sup>248</sup>

European Investment Bank. (2015). *Access-to-finance conditions for Projects supporting Circular Economy*. EIB, p.54

(EPMF); these not only increase the perceptibility of the CE in the entire financial environment but also send a message to the market.

According to the EIB, the effort towards the Circular Economy requires a systemic approach by all the actors covering the whole risk spectrum. This means that the market forces alone, despite being able to pave the way for the Circular Economy, should work in partnership with other stakeholders, in particular with public authorities, otherwise this may prove to create high opportunity costs and slowing the shift from a linear to a circular paradigm. The EIB finances the most relevant CE projects however the same institution regards its contribution to not be sufficient.

As reported by the G20 Study Group on Commodities of 2011 and current IMF data the wide fluctuation of commodities' price of the last decade is projected to be steadier, however owing to population growth, urbanisation and upward social mobility in developing countries there will be increasing demand for these resources and therefore they will be subjected to pressure. For this reason it is important to anticipate this situation and investing in the circular economy is a must.

In order to make the Circular Economy appealing for the private sector it is relevant however to promote it in terms of a cost-benefit analysis, in particular:  $\text{Cost}_{\text{CE TRANSITION}} < \text{Price}_{\text{SAVED RESOURCES}}$ .

The path to the implementation of the Circular Economy is based on innovation that in the most cases is demand driven; this means that if a commodity price rise, demand for innovation will follow. However depending just on market adjustments is not wise and public support is needed to prevent supply crises and EU's dependence on external resources.

## CHAPTER 2: EXTENDED PRODUCER RESPONSIBILITY UNDER A SUPPLY CHAIN PERSPECTIVE

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### 1. INTRODUCTION. REVERSE SUPPLY CHAINS AS ELEMENT OF THE CIRCULAR ECONOMY PARADIGM

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The Circular Economy is a conception aiming at shifting from the current economic paradigm based on *"take-make-dispose"*, to an *"industrial model that regenerates and restores materials, products, and other resources (energy) by circulating them in a system"*<sup>249</sup>. According to the Ellen MacArthur Foundation (EMF)<sup>250</sup>, this can be realized through the integration of: *'Reverse Flows'*, *'Circular Design'* and *'Circular Business Model'*.

*'Reverse flows'*, means closing the loop of supply chains and it implies companies to structure industrial systems in a way that components, products and materials can move in a loop. This can be achieved through repairing, remanufacturing, refurbishing and recycling. *'Circular design'* implies that products should be made durable, repairable and recyclable; this can be achieved through modular architectures, standardized components and materials that allow reverse streams. *'Circular business models'* include leasing, renting, servicing, or the sharing economy; they are model that at the same time maintains firm's property of the products and stimulate recovering, reusing and recycling,

Advocates of the Circular Economy assert that besides having environmental benefits, this new model can deliver economic advantages. However, according to Agrawal et al., these benefits can be over-evaluated if *"consumer behavior, technological feasibility, and business model, and key operational issues"*<sup>251</sup> are not taken into account. Operations' research can offer its expertise *"by providing knowledge on redesigning, contracting, product design, pricing, closed-loop supply chains, business models... besides it can*

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<sup>249</sup> See: Agrawal, V. V., Atasu, A., & Van Wassenhove, L. N. (2018). New Opportunities for Operations Management Research in Sustainability. *Manufacturing & Service Operations Management*, 1-12. P. 2

<sup>250</sup> See: Ellen Macarthur Foundation. (2014). *Towards the Circular Economy. Accelerating the scale-up across global supply chains.*

<sup>251</sup> (Agrawal, Atasu, & Van Wassenhove, 2018, p. 9)



*provide insights for how the different operational decisions should be made to make these business models more viable economically"*<sup>252</sup>. For this reason this chapter makes use of the operations perspective to analyze how businesses can be profitable and at the same time respecting environmental constraints.

## 2. REASON FOR THE NEED OF REVERSE SUPPLY CHAINS

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Pressure on the creation of Reverse Supply Chains has been given in the latest years by the growing awareness that raw materials are not unlimited; research showed that global reserves of zinc will finish by 2037<sup>253</sup>, while other elements such as gold, iridium, tungsten, silver are going to finish within fifty years. This is concerning both the public opinion - in particular green NGOs, and legislators around the world, that are pushing for the introduction of Extended Producer Responsibility (EPR) laws that require manufacturers to be responsible for their supply chains.

According to the EMF, if companies implemented circular supply chains (Closed-Loop Supply Chains), that involve recycling, reuse and remanufacturing, over US 1\$ trillion a year would be created globally by 2025 and 100.000 new jobs would be generated.<sup>254</sup>

Over the last 20-30 years a number of new products located at the end of traditional direct supply chain has been created: products whose functions could be rehabilitated through repairing or reusing, obsolete or end-of-leasing life products that keep on having value, products remaining on the shop's shelves, recalled products, parts and subassemblies coming from repairing (pull-and-replace).

Another issue to consider is the rise of the Internet and home shopping that combined with more liberal returns policies and shortened product life cycles, are a number of factors that have contributed to this phenomenon. These products are attracting even more attention by businesses, governments and consumers, first and

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<sup>252</sup> Idem.

<sup>253</sup> [Cohen (2007) in Ferguson and Souza, 2010]

<sup>254</sup> See: Bernon, M., Tjahjono, B., & Faja Ripanti, E. (2018). Aligning retail reverse logistics practice with circular economy values: an exploratory framework. *Production Planning & Control. The Management of Operations.*, 29(6), 483-497, p. 484

foremost because of their latent economic value but also, as already mentioned owing to the emergence of green laws and concerns.<sup>255</sup> The reason why products can be returned are various: for instance, '*commercial returns*' that are products given back to resellers within 90 days of purchase. Often these products just need light repair operations (cleaning and cosmetics) and must be re-put in the market as soon as possible. '*End-of-use returns*' is the case where a new versions of a product that still is functional have been introduced. The level of recovering of these products vary according to how intensively they have been used; in any case it is suggestable for remanufacturing firms to purchase good quality items. End-of-life returns are products that have become obsolete and useless. They can be used as parts recovery of for recycling.

It has been found out that return rates depend on the kind of product, seasonality but also local market; return rates of hard goods are around 5-9 %, while are around 35% for high fashion products and even higher for Internet and catalogue sales. Returns, moreover are higher in North America rather than in Europe because of different return policies, even though returns are increasing in Europe because of the penetration in European market by US firms (Internet sales)<sup>256</sup>. The reason why products are returned are different in a consumer or retail versus commercial and industrial environment, in fact commercial and industrial returns concern performance issues while consumer returns could be associated on impulsive buying. Despite Reverse Logistics could be an important source of revenues, because of the potential value of recovered items, manufacturers little take advantage of it so that an important part of the product value is lost. The reason is that implementing a reverse supply chain is expensive, moreover attention by managers has traditionally been directed to the forward supply chain and therefore shifting it to the reverse one requires important efforts.

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<sup>255</sup> For follow- up see: Blumberg, D. F. (2004). *Introduction to Management of Reverse Logistics and Closed Loop Supply Chain Processes*. CRC Press

<sup>256</sup> See: V. Daniel R., G., Souza, G., Van Wassenhove, L., & Blackburn, J. (2006). Time Value of Commercial Product Returns. *Management Science*, 1200-1214.

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## A. BACKGROUND

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The notion of reverse logistics has developed over the time, starting from the 70s as an idea concerning the recycling of raw materials; up to the eighties the academia referred to it as ‘*reverse channels*’ or ‘*reverse flow*’. This concept developed during the 1980s because of the growing microminiaturization, large-scale integration and modularization design in the electronics industry. The nineties were characterized by contributions in the field of engineering and operations and the very first definition of reverse logistics goes back to this period, that is distinguished by efforts aiming at recovering both the value of product and processes<sup>257</sup> up to present days where reverse logistics is included in supply chain management studies and it involves an holistic definition of supply chain, taking into account both forward and reverse flows and it is referred as ‘*closed-loop supply chain*’ (CLSC).

Initially the interest in this field embraced areas such as computer technology, advanced office automation, military and weapon systems logistics support. Improvement in technology and sophistication increased the value of materials for repair and allocation and CLSC widened its scope in other industries such as the mechanics and electromechanic ones.

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### 3. CLOSED-LOOP SUPPLY CHAIN BUSINESS MODEL (CLSC)

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#### A. INTRODUCTION TO CLSC AND REVERSE LOGISTICS (RL)

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*“Closed-loop supply chains (CLSC) focus on taking back products from customers and recovering added value by reusing the entire product, and/or some of its modules, components, and parts...Today we define closed-loop supply chain management as the design, control, and operation*

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<sup>257</sup> Rubio, S., & Jiménez-Parra, B. (2017). Reverse Logistics: Concept, Evolution and Marketing Challenges. In A. Barbosa-Póvoa, A. Corominas, & J. de Miranda, *Optimization and Decision Support Systems for Supply Chains* (pp. 41-62). Springer. P. 44

*of a system to maximize value creation over the entire life cycle of a product with dynamic recovery of value from different types and volumes of returns over time.”*<sup>258</sup>

According to Blumberg CLSCs comprehend those phases: *‘forward logistics and direct supply chain management’, ‘reverse logistics’, ‘depot repair, processing, diagnostics and disposal’.*<sup>259</sup>

Forward logistics and direct supply chain management consists of the traditional supply chain management, that means it takes care of the products’ life cycle from the original parts to the final outcome, from the producers’ warehouses to the final buyer. Reverse logistics’ activities cover all the return supply chain from the final user location to be reprocessed or recycled. It can be an independently pursued by a third operator or being included in a more general closed loop system. Depot repair, processing, diagnostics and disposal is the set of services supporting the Reverse Logistics process and aimed at bringing back products to the forward supply chain or in alternative into secondary markets.

A closed-loop supply chain is therefore the result of the coordination of different actors: the forward supply chain, the market, and the reuse supply chain.

As it emerges from figure 1, the forward supply chain sees the finished good at the end of the supply chain, as it has traditionally been conceived. At the opposite, reverse supply chain views product returns as the starting point; as products move on the reverse chain they are gradually recapturing their remaining values. (Bernon, Tjahjono, & Faja Ripanti, 2018). Entering the closed-loop supply chain means putting a product in the market for at least one life cycle through the forward supply chain.

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<sup>258</sup> R. Guide , V., & Van Wassenhove, L. (2009). The Evolution of Closed-Loop Supply Chain Research. *Operations Research*, 10-18, p. 12

<sup>259</sup> See: (Blumberg, 2004. P. 12)

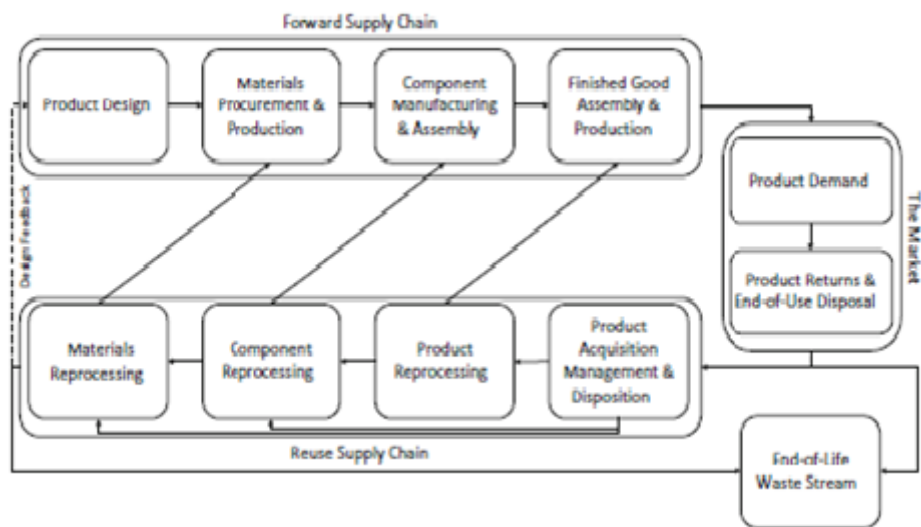


FIGURE 5 CLOSED LOOP SUPPLY CHAINS (BLUMBERG, 2004)

In a closed-loop system the actor's role are reversed (even if clients do not recognize themselves as suppliers). But the problems deriving from the fact that reverse logistics follows an opposite path are not finished, in fact problems may for example arise when dealing with a huge number of suppliers (contracts), that has implications on the heterogeneous quality of returns.

	Primary/secondary markets	Reverse market
Role of manufacturer	Supplier	Consumer
Role of customer	Consumer	Supplier
Origin of traded products	Manufacturer	Customer
Sink of traded products	Customer	OEM, IRC, landfill, dissipation
Product flow	Diverging	Converging
Network structure	Few-to-many	Many-to-few
Main source of uncertainty	Demand side	Supply side
Input quality	Homogeneous, deterministic	Heterogeneous, stochastic
Scope of market	Customer-/functionality centered	Product-/material-centered

Note: OEM = original equipment manufacturer; IRC = independent resource company

FIGURE 6 "COMPARISON OF MARKET CHARACTERISTICS" (STINDT, ET AL. 2016)

Reverse Logistic is defined as of the Council of Logistics Management as *“the process of planning, implementing and controlling the efficient, cost/effective flow of raw materials, in process inventory, finished goods, and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal.”*<sup>260</sup>

<sup>260</sup> Hawks, K. (2006). [www.rlmagazine.com](http://www.rlmagazine.com/edition01p12.php). Retrieved August 31, 2018, from <http://www.rlmagazine.com/edition01p12.php>

Other definitions include<sup>261</sup>:

*"...the term often used to refer to the role of logistics in recycling, waste disposal, and management of hazardous materials; a broader perspective includes all relating to logistics activities carried out in source reduction, recycling, substitution, reuse of materials and disposal"* (Stock 1992).

*"The process of planning, implementing and controlling the efficient, cost-effective flow of raw materials, in-process inventory, finished goods, and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal"*

(Rogers and Tibben-Lembke 1999).

*"...a process by which a manufacturing entity systematically retrieves previously shipped products or parts from the point-of-consumption for possible recycling, remanufacturing, or disposal"* (Dowlatshahi 2005).

The European Working Group on Reverse Logistics (REVLOG) defined reverse logistics as *"the process of planning, implementing and controlling backwards flows of raw materials, in process inventory, packaging and finished goods, from a manufacturing, distribution or use point, to a point of recovery or point of proper disposal"* (De Brito and Dekker, 2004)

Therefore, a closed/loop supply chain includes traditional forward supply chain activities and the additional activities of the reverse supply chain. These additional activities include: *'product acquisition', 'reverse logistics', 'testing, sorting and disposition', 'remanufacturing'* and *'remarketing'*.<sup>262</sup>

In the *product acquisition* phase remanufacturing firms should assure their client an adequate quantity of returns that meets their standards. In the *reverse logistics* stage managing returns requires a consolidation center that collects items from different locations and therefore makes transportation cost-effective; literature however

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<sup>261</sup> See: Rubio, S., & Jiménez-Parra, B. (2017). Reverse Logistics: Concept, Evolution and Marketing Challenges. In A. Barbosa-Póvoa, A. Corominas, & J. de Miranda, *Optimization and Decision Support Systems for Supply Chains* (pp. 41-62). Springer. P. 43

<sup>262</sup> R. Guide, V., P. Harrison, T., & Van Wassenhove, L. (2003). The Challenge of Closed-Loop Supply Chains. *Interfaces*, 33(6), 3-6

stresses that its better to separate forward and reverse logistics chains. *Testing, sorting and disposition* analyse if returns are available for remanufacturing and if not, they should be disposed to be scrapped or recycled – differently, spare parts can be saved or sold to a broker. In the *remanufacturing* phase returns are remanufactured according to their characteristics and/or to the clients’s request. With regard to *remarketing* remanufacturing firms must have remarketing capabilities in order to sell remanufactured products in the market. “*For example, to recover end-of-use mobile phones, the first step is to have access to sufficient quantities of the right-quality phones at the right price (product acquisition). The acquired mobile phones must be transported to a recovery facility (reverse logistics) where they are tested, sorted, and graded (product disposition) prior to selecting the best product recovery option (remanufacturing, repair, parts recovery, material recycling, or disposal). Assuming that the optimal recovery option for a given mobile phone is remanufacturing, that phone then needs to be sold in a secondary market (remarketing).*”<sup>263</sup>

#### 4. DESIGN OF CLSC

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##### A. FUNCTIONING OF CLSCS

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According to Pokharel and Mutha (2009), an RL system is composed by inputs, structure, processes and output. Input are used products, recycled materials, used/new parts, all entering the RL process. Inputs are usually collected in warehouses or retailers where they are inspected. At the inspection phase, items are selected according to their quality level. After this phase the items can follow different paths: consolidation for disposal, processing (or processing for remanufacturing) or remanufacturing. Processing for remanufacturing implies separation and disassembly of parts that will be used for different aims, e.g. spare parts market.

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<sup>263</sup> R. Guide , V., & Van Wassenhove, L. (2009). The Evolution of Closed-Loop Supply Chain Research. *Operations Research*, 10-18. p.11

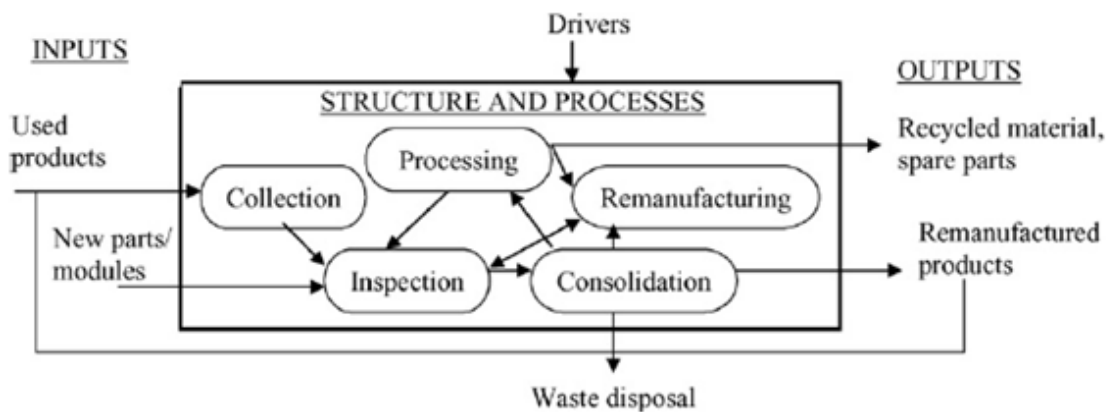


FIGURE 7 "CONTENT CATEGORIES FOR AN RL SYSTEM" FROM POKHAREL & MUTHA (2009)

#### REVERSE LOGISTICS NETWORK DESIGN (RLND)

According to Alumur and colleagues<sup>264</sup> an optimal RLND demands *"the determination of optimal localizations and capacities of collection centers, sorting centers, remanufacturing facilities and/or recycling plants"*<sup>265</sup>

However, what is problematic in an RLND setting is choosing between third party providers or integrating reverse logistics into the forward supply chain, from which would follow a CLSC. Both choices however, face two captious issues: End of Use (EoU) products' collection and recovery alternatives (remanufacturing, reuse and recycling).

In any case the design of a RLN is based on: *"collection of EoU products, inspection and classification, recovery process, remanufacturing and 'recycling'"*<sup>266</sup>.

*Collection of EoU products* is the beginning point of the process and different networks exist depending on whether the pick-up is made by the manufacturer or the remanufacturer, throughout a network of distributors and retailers or third-

<sup>264</sup> Alumur, S. A., Nickel, S., Saldanha-da-Gama, F., & Verter, V. (2012). Multi-period reverse logistics network design. *European Journal of Operational Research*, 220, 67 –78

<sup>265</sup> (Rubio & Jiménez-Parra, 2017, p. 47)

<sup>266</sup> Rubio, S., & Jiménez-Parra, B. (2017). Reverse Logistics: Concept, Evolution and Marketing Challenges. In A. Barbosa-Póvoa, A. Corominas, & J. de Miranda, *Optimization and Decision Support Systems for Supply Chains* (pp. 41-62). Springer.



parties. During this phase some challenges arise: strategic decisions, such as position and number of recovery facilities, capacity and technology<sup>267</sup>, tactical decisions, transportation planning system or EoU inventory management, operational decisions planning of collection routes for EoU products and configuration of collection batches. *Inspection and classification* is an issue linked to product recovery is the uncertainty connected to recovered products taking into consideration of quantity, quality and time. *Recovery process* is the point in which the economic value of the product is retrieved, and it is achieved by: reuse - it conceives basic activities that do not touch the structure or function of the product. Examples are some kind of packaging and containers (pallets, returnable glass bottles, plastic containers). *Remanufacturing* implies further activities aiming at reestablish the same characteristics of the product; those activities are disassembly, inspection, repair and assembly. When it is possible from a financial or technical point of view, this phase can improve or update the functions of the products. Examples: laptops, printers, mobile phones. *Recycling* is simply oriented at recovering the economic value of raw materials, for instance packaging material, glass, paper, plastic, aluminum.

Activities	Strategic	Tactical	Operational
Collection	<ul style="list-style-type: none"> <li>• Location, number and capacity of collection points</li> <li>• Lay-out</li> <li>• Process systems</li> </ul>	<ul style="list-style-type: none"> <li>• Assignment of End-of-Life (EoL) products to recovery centres</li> <li>• EoL inventory management</li> <li>• Transport means</li> </ul>	<ul style="list-style-type: none"> <li>• Collection batches</li> <li>• Collection routes</li> <li>• Load configuration</li> </ul>
Inspection and sorting	<ul style="list-style-type: none"> <li>• Location, number and capacity of inspection and sorting facilities</li> <li>• Training</li> </ul>	<ul style="list-style-type: none"> <li>• Inventory management for recoverable products</li> <li>• Assignment of tasks: disassembly, cleaning, restoring, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Recovery option decision: reuse, remanufacturing, recycling</li> </ul>
Recovery	<ul style="list-style-type: none"> <li>• Process systems: best available technologies</li> <li>• Markets for recovered products</li> </ul>	<ul style="list-style-type: none"> <li>• Inventory management for recovered products</li> <li>• Effects on Aggregate Production Plan</li> </ul>	<ul style="list-style-type: none"> <li>• Effects on Master Production Plan</li> <li>• Bill of materials</li> </ul>
Disposal	<ul style="list-style-type: none"> <li>• Disposal systems</li> </ul>	<ul style="list-style-type: none"> <li>• Inventory management for non-recoverable products</li> <li>• Transportation means</li> </ul>	<ul style="list-style-type: none"> <li>• Waste management</li> </ul>

FIGURE 8 REVERSE LOGISTICS DECISIONS FROM (RUBIO & JIMÉNEZ-PARRA, 2017)

<sup>267</sup> (Rubio & Jiménez-Parra, 2017, p. 46)

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## B. INDUSTRIES' CHARACTERISTICS AND BUSINESS MODELS

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According to the kind of industry the manufacturer belongs to and its network - e.g. manufacturers, sellers, buyers, distribution channels, third and fourth party logistics providers - and in general the value and the type of materials involved, it should be implemented a business models; in the field of Reverse Logistics and Closed Loop Supply Chain, four model exist: *'Basic RL model'*, *'High-Tech Closed-loop Supply Chain'*, *'Low-Tech Closed-loop Supply Chain'* and *'Consumer-oriented'*.

The Basic RL model is the traditional model and starting research began on this topic. In this model, the end user decides autonomously to give up the products that are collected by an independent provider; it is evident that the direct supply chain it is not linked to reverse logistics. Unwanted materials are stored in central depot where they are processed and disposed. In general pick up and collection of household waste is managed by governments, that usually subcontract this service to specialized companies; hazardous waste is normally collected separately and then disposed in compliance with local green regulation. It is a simple business model, based on the collection and disposal of end of use materials and earnings are based on government contract and the value created from recycling.

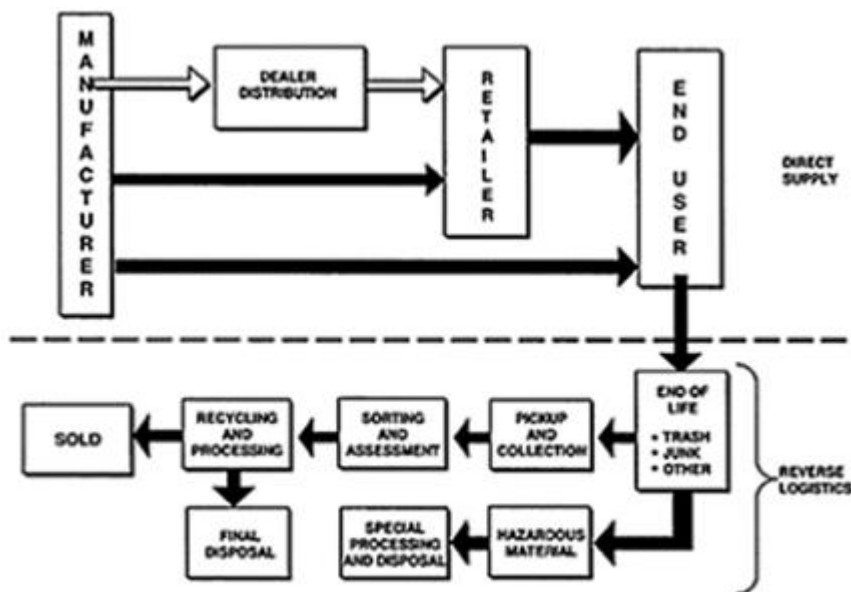


FIGURE 9 BASIC RL MODEL FROM BLUMBERG (2004)

In the High-tech closed loop supply chain model, original equipment manufacturers (OEM) belonging to the high-tech industry, manage both the forward and the reverse supply chain – it is a pure closed-loop supply chain model. Subassemblies, parts and components are usually disposed by the OEM through indirect channels working on behalf of the same OEM. Branches of the OEM (or organizations under contract by the OEM) take care of service and support of high-tech products under warranty, extended warranty or after warranty. In order to make the supply chain efficient, high-tech products are tracked by serial numbers. Tracking by the same organization is important as this provides the OEM with experience about failure and repair, but also it helps keeping inventory costs under control, considering the high value of parts, subassemblies and units.

The RL flow see returned material going to: inventory for direct resupply in the same field, qualification and reconfiguration process, where material can be reused during remanufacturing or sold into secondary markets.

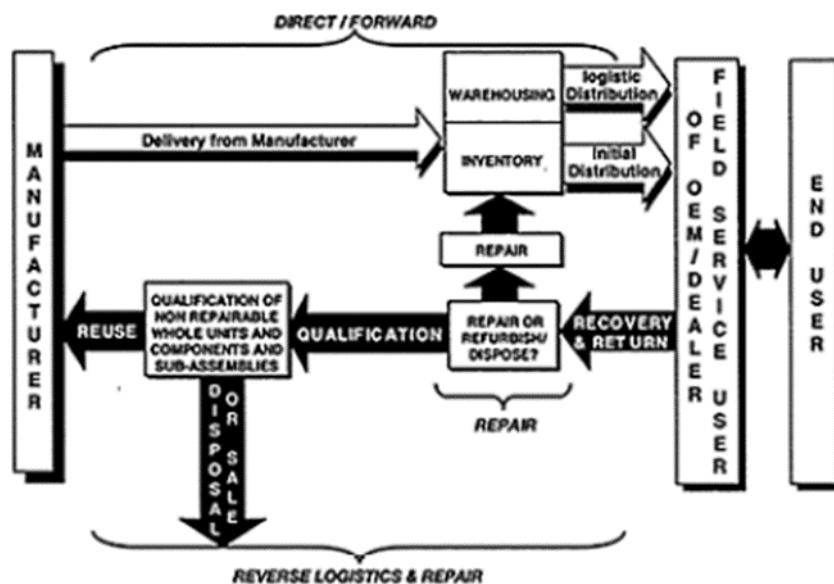


FIGURE 10 HIGH TECH CLOSED LOOP SUPPLY CHAIN FROM BLUMBERG (2004)

Low tech closed loop supply chain model works in a similar fashion as the high tech one, except for the relevant fact that reverse logistics operations are managed by the end user or purchaser. The end user is normally an important organization that own its internal plant and building maintenance service forces (or hire third party logistics organizations), that monitor the entire life cycle of products. The RL and the direct supply chain are independent. This absence of circularity makes for manufacturers tracking and control difficult, as they lack data about parts demand and failure rates.

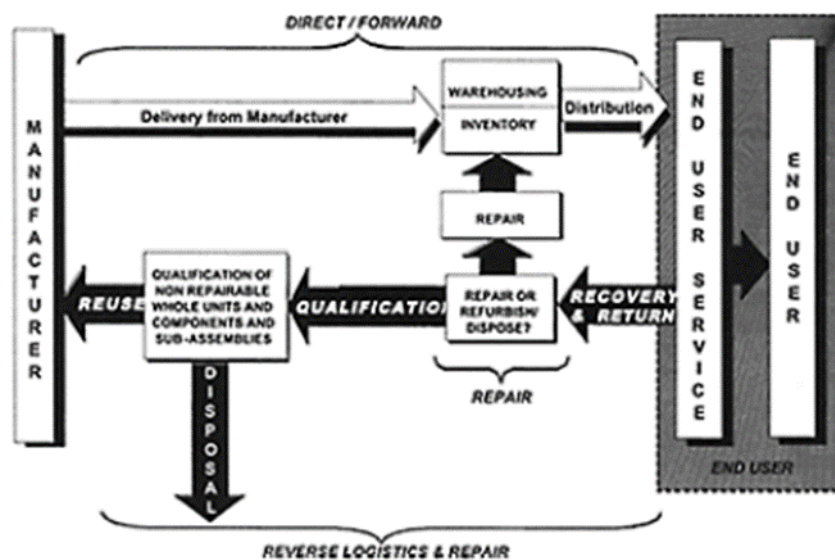


FIGURE 11 LOW TECH CLOSED LOOP SUPPLY CHAIN FROM BLUMBERG (2004)

Consumer-oriented CLSC concerns the supply chain in consumer goods markets, a sector in which returns are particularly high. A critical aspect of this model (analogous to the low tech model) is the existence of independent retailers that besides creating control problems for the entire supply chain (forward and reverse) it raises other issues particular of this sector, that is retailers can return products rather or not they reach their end of use, for example because they need to clear shelves or for obsolescence; this can lead the to the resale of products through discount sales and the secondary market, an issue that firms should take into consideration of products through discount sales and the secondary market.

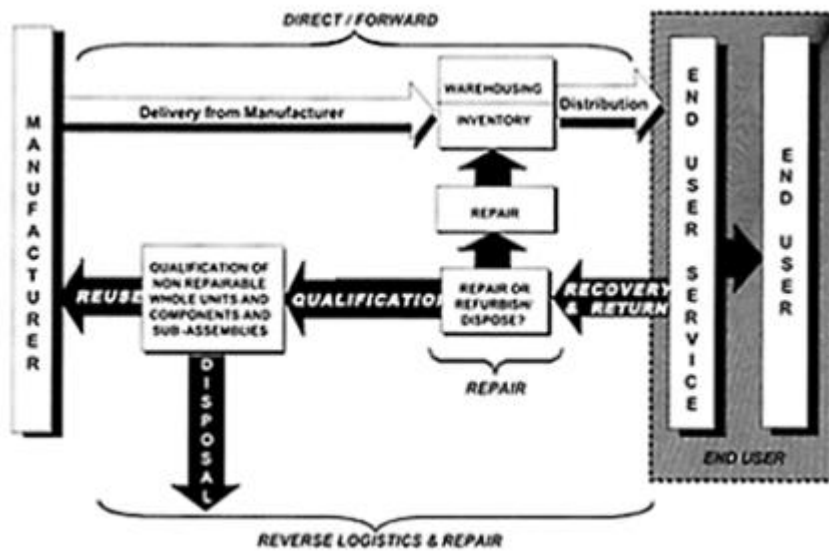


FIGURE 12 CONSUMER-ORIENTED CLSC, FROM BLUMBERG (2004)

### C. REVERSE SUPPLY CHAIN DESIGN

In Figure 8 it is depicted that on a total amount of 1000\$, more than 45% is lost, mostly because of downgrading of the product to a lower-valued one but also it ends as salvaged components or scrap because it is not usable anymore or became obsolete; it may also be that the product lost its value over time.

In any case a proportion of returns cannot be reprocessed. Managers should take attention to the value of time of returned products. An effective tool is the product's marginal value of time that is *“the loss in value per unit of time spent awaiting completion of the recovery process”* (Blackburn, et al. 2004, p.10). The marginal value of time varies depending on the product category, for example PCs can lose 1% of their value per week, and this percentage raises when the product reaches its end-of-life; in this situation returned items can lose up to 10-20% of their value just because of time delays. In the case of camera or power tool, they have lower marginal value of time that translates into a cost of delay of 1% per month.

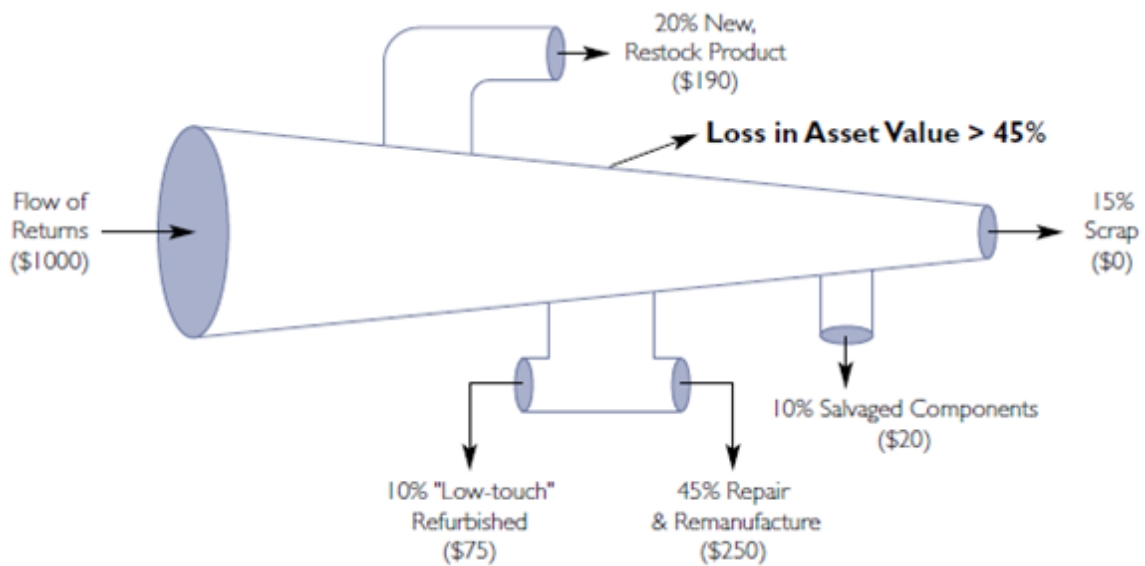


FIGURE 13 THE SHRINKING VALUE OF TIME" FROM (BLACKBURN, GUIDE JR., SOUZA, & VAN WASSENHOVE, 2004)

In order to gain monetary value, supply chains should be designed in a way that makes them faster while reducing delays. Marginal value of time (MTV) is therefore relevant. Managers should implement the concept of "preponement", that is "making a disposition as early as possible to avoid processing returns with no recoverable value"<sup>268</sup>

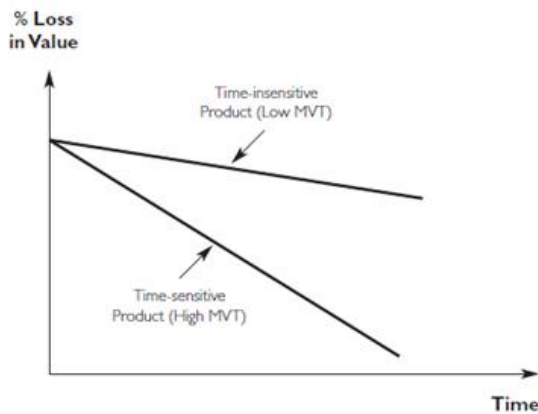


FIGURE 14 "DIFFERENCES IN MARGINAL VALUE OF TIME FOR RETURNS" FROM BLACKBURN ET AL (2004)

<sup>268</sup> Blackburn, J., Guide Jr., V., Souza, G., & Van Wassenhove, L. (2004). Reverse Supply Chains for Commercial Returns. *California Management Review*, 6-22.p. 7

Fisher's<sup>269</sup> taxonomy of strategic design choices, taken from the forward supply chain can be translated into the reverse supply chain: '*efficient*', the supply chain is meant to deliver product at cheap cost; they work better for functional products (low marginal value of time like disposable cameras and power tools), according to Blackburn, "*efficient supply chains sacrifice speed for cost efficiencies*".<sup>270</sup>

Responsive: the supply chain requires velocity of response and it is better designed for innovative products (high marginal value of time, PCs); "*in a responsive chain, speed is usually achieved at higher costs*".<sup>271</sup>

It is evident that choosing between an efficient and a responsive supply chain is a trade-off.

	Efficient Chain	Responsive Chain
Low MVT Product	Match	No Match
High MVT Product	No Match	Match

TABLE 1 TIME-BASED REVERSE SUPPLY CHAIN DESIGN STRATEGY FROM (BLACKBURN, GUIDE JR., SOUZA, & VAN WASSENHOVE, 2004)

The difference between efficient and responsive chain lays in the positioning of the evaluation activity that is - if the aim is cost-efficiency the supply chain structure should be realized so to centralize the evaluation activity, while if responsiveness is the objective a decentralized evaluation activity will be needed in order to limit time delays.

According to the kind of product Blackburn and colleagues suggest the following models: '*centralized model*' and '*decentralized model*'.

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<sup>269</sup> M. Fisher, "What Is the Right Supply Chain for Your Product," *Harvard Business Review*, 75/2 (March/April 1997): 83-93

<sup>270</sup> (Blackburn, et al. 2004, p. 12)

<sup>271</sup> idem

The centralized model (postponement) model aims at reaching economies of scale and in order to achieve that recovering products follow a process that see them first of all be sent in bulk to the remanufacturing facility. Once products are delivered, they are tested and evaluated to understand their condition; afterwards they are sent to an ad hoc area (or facility) for disposition that entails restocking, refurbishing, parts salvaging, or scrap recycling. Repair and refurbishment are often outsourced facilities.

This model is based on the criteria of postponement, *“delayed product differentiation”*, that implies *“delaying credit issuance and testing, sorting, and grading until it has been collected at a central location”*<sup>272</sup>; economies of scale are reached because separate inventories are avoided. This model benefits the third-party that credits product issuance and the retailer who just have to send product to a central location. It is a model suggested for products with low marginal value of time, such as power hand tools.

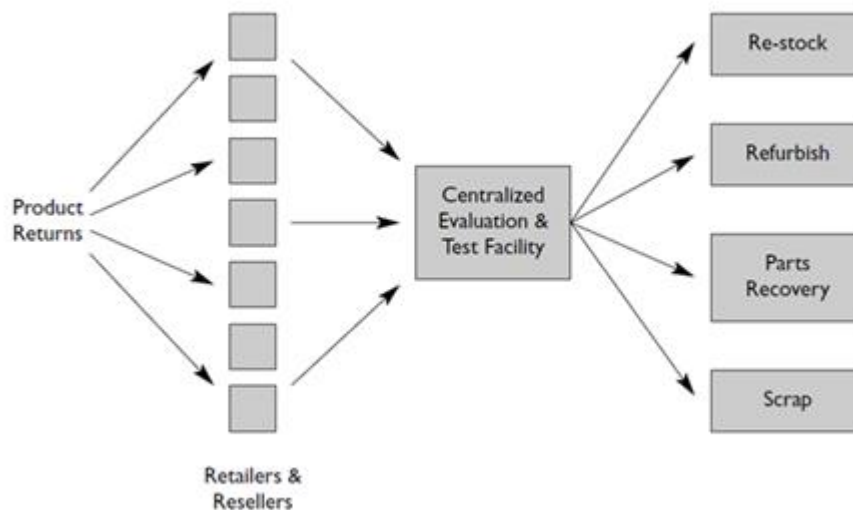


FIGURE 15 "CENTRALIZED, EFFICIENT SUPPLY CHAIN" FROM BLACKBURN ET AL (2004)

The decentralized model (preponement) model is based on the preponement criteria where evaluation and testing of the products are centralized. This helps saving times by reducing time delays for the management of new and scrap products; it also

<sup>272</sup> (Blackburn, Guide Jr., Souza, & Van Wassenhove, 2004, p. 14)



helps making faster the processing of the left products, those that need to be tested and repaired furtherly.

Preponement is important in particular with high marginal value of time products as those products tend to lose the most from delays, thanks to the initial selection of the products.

Before choosing for a preponement model two question should be faced: 1. is it technically workable? 2. Is it convenient to check the condition the products? 3. In which way it can make the reseller do that at the point of return? It could be through incentives, for example by shared savings contract between the manufacturer and resellers.

This model helps reducing time delays, but it is expensive because of high operative costs and fixed assets. It is feasible for PCs, printers and in general for products with high marginal values of time.

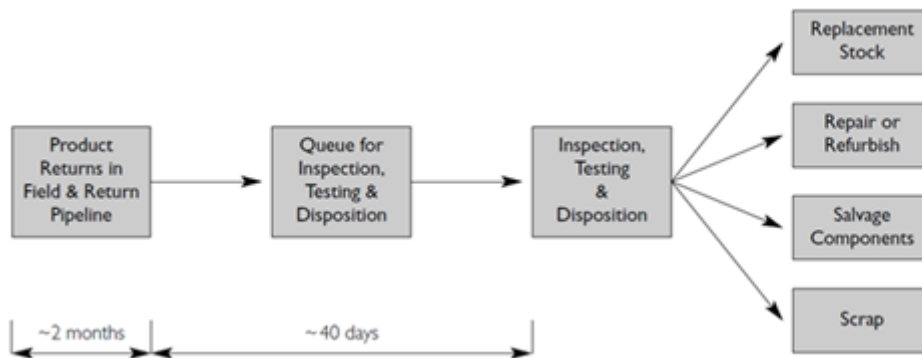


FIGURE 16 DELAY IN THE DECENTRALIZED MODEL. FROM BLACKBURN ET AL, 2004

#### INTERNALIZE OR EXTERNALIZE THE SUPPLY CHAIN?

Outsourcing Reverse Logistics activities means buying these services from third parties; this can be done fully or partially. Manufacturers face a trade-off when deciding if internalize or externalize the remanufacturing phase<sup>273</sup>; OEMs should

<sup>273</sup> See: Michaud, C., & Llerena, D. (2011). Green Consumer Behaviour: an Experimental Analysis of Willingness to Pay for Remanufactured Products. *Business Strategy and the Environment*, 408-420

implement vertical integration (or joint ventures and alliances with rivals) if they can share their know-how, in fact this prevent firms to be subordinate to third-parties providers. Savaskan<sup>274</sup> and colleagues found out that if OEMs guaranteed incentives to traditional retailers to pick up used products, they would gain better collection rates compared to having an internal reverse logistics structure or outsourcing. Positive aspects related to outsourcing actually depend on the kind of activity and products dealt by firms. For example according to Serrato et al.<sup>275</sup> companies having high return variability and short product life cycle should outsource their activities; while as of Insigna and Werle<sup>276</sup> companies should outsource reverse logistics activities only if they lack reverse supply chain competences or this activity is not strategic for the organization.

Reasons for outsourcing are according to Kannan et al<sup>277</sup> that third parties own updated information system facilities, equipment and warehouses adequate to provide a 360-degree reverse supply chain service; if reverse logistics is not the main activity of a firm, it can create difficulties and leading to inefficiency; outsourcing leaves companies to focus on their main activity; third-parties can obtain economies of scale; companies can diminish their asset base by dedicating spared capital for core activities.

Downturn of outsourcing according to Tadelis<sup>278</sup>, however is that it can lead to unexpected higher costs, scant flexibility and other hidden problems.

## 5. STRATEGIC AND MARKETING ISSUES

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<sup>274</sup> Savaskan RC ,Bhattacharya S , VanWassenhove L N . (2004) Closed-loop supply chain models with product remanufacturing. *Management Science* 50(2): 239–252

<sup>275</sup>Serrato, M.A., Ryan, S.M., Gaytan, J., 2007. A Markov decision model to evaluate outsourcing in reverse logistics. *Int. J. Prod. Res.* 45 (18–19), 4289–4315.

<sup>276</sup> Insigna, R.C., Werle, M.J., 2000. Linking outsourcing to business strategy. *Acad.Manag. Exec.* 14, 58–70.

<sup>277</sup> Kannan, G., Palaniappan, M., Zhu, Q., Kannan, D., 2012. Analysis of third partyreverse logistics provider using interpretive structural modeling. *Int. J. Prod.Econ.* 140 (1), 204–211.

<sup>278</sup> Tadelis, S., 2007. The innovative organization: creating value through outsourcing.*Calif. Manag. Rev.* 50 (1), 261–277

From a strategic point of view it is important to analyze the value proposition of clients. It is relevant to fortify the relationship with clients as it brings those advantages: competitive advantage over rivals; better productivity; higher profits and lower operative fares; increased information and data precision.

*"Managing the need for dynamic and real time coordination and control of the full logistics pipeline of parts, sub-assemblies, and items of supply not only significantly increases the efficiency of the field service organization, but also can result in a more significant real bottom line dollar savings in the overall costs of operations, than activity in any other areas of service industry"* .<sup>279</sup>

In order to improve the reverse flow of products the logistics and financial department should collaborate so to control delivery costs and stock of returned items; this will allow to take costs under control and enhance customer satisfaction. In fact sustainability is a holistic objective that requires the integration of marketing with other departments, not just the logistic one but also eco-design for modularity and disassembly; critical areas to be included are strategic planning, forecasting, product and processes development and demand management. (Malhotra & Sharma, 2002, in Lee and Lee Lam, 2012). However this step is a long-term one and requires investment also in workers' education; in any case the cost will be worthwhile.

Another issue to take into consideration is that inventory should be managed on a daily basis, taking advantage of technology as manual recording is subjected to errors. In order to improve data it should be used bar code or RFID.

Analysis of new reverse logistics performance can be done both on a quantitative and on a qualitative level; quantitatively performance can be assessed through: time spared in the reverse logistics process, e.g. returns lead time; savings associated with the return phase; contribution to profits; savings in inventory holding costs; quantitative data can be analyzed through the use of graphs.

Qualitative measures are: diminishing of incertitude with consequences on better inventory management; more reliable customer service; reduction of stocks out and other negative circumstances.

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<sup>279</sup> See: Lee, C., & Lee Lam, J. (2012). Managing reverse logistics to enhance sustainability of industrial marketing. *Industrial Marketing Management*, 589-598. P. 593

Qualitative information can be assessed through employee and customer feedbacks. Analyzing results is a central issue in the reverse supply chain and constant feedback is relevant for this activity. The silver lining of results analysis are: possibility to control if the solution implemented is efficient; checking the cost of current activities; identified activity that are redundant and therefore represents costs that can be saved; flexibility in adapting to the changing environment.

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#### A. GREEN MARKETING

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Green marketing is peaking because enterprises understood that they have the chance to sell their products at higher prices to environmentally-concerned customers; moreover, it can foster an enterprise's name and client's fidelity. Once it was believed that remanufacturing, recycling or refurbishing was not economic, but now it has been proved that it is more convenient to remanufacture instead of manufacturing products sourcing for new raw materials. Moreover new eco-friendly policies are being introduced, however companies find obstacles in the implementation of environmental policies because it demands competence in ecology, expertise and alignment between industries and territories.

Green marketing requires the following steps: *“green marketing analysis, green market developments, sustainable operation management, and customer acquisitio”*<sup>280</sup>.

*Green marketing analysis* is important to identify the client's demand; this not only includes technical characteristics, but also social and ecologic issues, in fact *“a truly sustainable corporation is one that creates shareholder value while protecting the environment and improving the lives of those with whom it interacts”*<sup>281</sup>This phase can be enhanced by the use of IT for market analysis.

- Green market developments: it should be recognized the customer's segments and accordingly to the results using the most adequate marketing campaign.

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<sup>280</sup> Lee, C., & Lee Lam, J. (2012). Managing reverse logistics to enhance sustainability of industrial marketing. *Industrial Marketing Management*, 589-598.

<sup>281</sup> (Lee & Lee Lam, 2012, p. 595)

- Sustainable operation management: products and information flow should be integrated in order to achieve efficient reverse supply chains; this can diminish delivering costs and environmental impact while at the same time increasing clients' satisfaction.
- Customer acquisition: by setting a green image, corporations acquire and maintain clients trust. The role of the customer is central and companies must study customer demand in order to acquire those information such as environmentally friendly products demand or availability to pay a premium price for the same. Besides competitors' initiatives have to be taken into account while thinking about the company's green strategy.

It has been found out that it exists a negative correlation between the intention to buy remanufactured products and consumer's knowledge in the remanufacturing field, and the reason is that clients do not assess the same quality level of new products, moreover Hazen et al.<sup>282</sup> assert that the ambiguity connected to remanufactured products make them less likely to be sold. However in a study by Gaur et al.<sup>283</sup> it was found out that customers would be more likely to pay a premium price if they had a clear knowledge about terminology used in this field (refurbished, returned, rebuilt, remanufactured etc.) but also over the product's life cycle; lacking this information customers will continue to use price as a quality parameter.

According to Jimenez-Parra et al: *“OEMs and remanufacturers could orient their marketing policies towards actions aimed at identifying consumers with a more favorable attitude towards these products. Their marketing campaigns could be directed not only at these consumers themselves but also at their closest social circles, which we have found to be an important referent in the intention to purchase”*.<sup>284</sup> Companies should monitor the different consumer segments (green

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<sup>282</sup> Hazen, B. T., Overstreet, R. E., Jones-Farmer, L. A., & Field, H. S. (2012). The role of ambiguity tolerance in consumer perception of remanufactured products. *International Journal of Production Economics*, 135, 781–790

<sup>283</sup> Gaur, J., Amini, M., Banerjee, P., & Gupta, R. (2015). Drivers of consumer purchase intentions for remanufactured products. A study of Indian consumers relocated to the USA. *Qualitative Market Research: An International Journal*, 18(1), 30–47

<sup>284</sup> (Rubio & Jiménez-Parra, 2017, p. 54)

consumers and functional conscious consumers) and direct to them adequate promotion activities. Wang et al.<sup>285</sup> confirm it by stressing that OEM should develop marketing campaign taking into considerations "lower price" and "environmentally friendly" attributes, as are the focal property customers willing to buy remanufactured products are interested in.

In general motivations play a decisive role in the purchasing intention; according to Subramanian and Subramanyam<sup>286</sup> brand image can play an important role in the consumer purchasing intention, in fact *"if a good brand offers a remanufactured product, then they would purchase those without any hesitation"*.<sup>287</sup>

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#### B. REVERSE MARKET'S ATTRACTIVENESS

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Original equipment manufacturer may decide to enter the reverse logistics market because they want to earn from the replacement of primary inputs (recycling, retrieval) but also because they want to add new segments to their activity with new remanufactured products.

Entering the Reverse Logistics market however poses some challenges that make potential entrants to abandon their idea. Before entering a market it should be assessed its attractiveness and with regard to RL, managers should considerate the ease to acquire items in a sufficient number and quality, the characteristics of the secondary market and how to market these new products. Another issue to take into consideration is if the company's product portfolio is coherent with reverse logistics, for example, according to Bernon et al. (2018), certain products like photocopiers and mobile phones are more feasible to be recovered in a reverse supply chain. Product design here plays a crucial role, actually closed-loop supply chains start from returned products that have been designed in a way that makes them easily recovered.

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<sup>285</sup> Wang, Y., Wiegerinck, V., Krikke, H., & Zhang, H. (2013). Understanding the purchase intention towards remanufactured product in closed-loop supply chains: An empirical study in China. *International Journal of Physical Production and Logistics Management*, 43(10), 866–888

<sup>286</sup> Subramanian, R., & Subramanyam, R. (2012). Key factors in the market for remanufactured products. *Manufacturing & Service Operations Management*, 14, 315–326.

<sup>287</sup> (Rubio & Jiménez-Parra, 2017, p. 54)

When deciding to enter the remanufacturing industry, a firm has to keep in mind it is like to enter in a new industry, and taking into consideration the Porter's five forces model can be useful, besides when entering this industry it should be done if it seems as an attractive one.

Porter's five forces<sup>288</sup> is a model assessing the market's appeal, and it is an useful tool for companies which are planning to enter a certain business. According to Porter five forces influence a market's attractiveness:

1. Bargaining power of suppliers: it has to do with suppliers' concentration; in reverse channels the main issue is the source of returns.
2. Bargaining power of customers: it is important to know how the customers will use the products, but also how do they consider them. Technological generation can play an important role.
3. Threat of new entrants: it deals with barriers to entry in a sector; in this case it is low because it is a labour intensive industry, governments do not pose limits this industry and distribution channels are varied (Web).
4. Threat of substitute products or services: competition from other non remanufactured products, in particular 'cheap imports'
5. Intensity of rivalry: it depends on industry concentration, and as the remanufacturing sector is composed by a myriad of firms, competition is aggressive.

However, according to Stindt et al.<sup>289</sup>, this evaluation can be made just on “forward” businesses and not to companies dealing in the recovered products market, in fact “reverse” and “forward” markets have completely different characteristics, while the actor's role are the opposite. For example if manufacturers in a forward market play the role of suppliers, in the reverse they are consumer, while customers in the reverse market are suppliers. The problem is that often

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<sup>288</sup> See: How competitive forces shape strategy. Porter, Michael E. Harvard Business Review, Mar 01, 1979; Vol. 57, No. 2, p. 137-145

<sup>289</sup> Stindt, D., Frota Neto, J., Nuss, C., Dirr, M., Jakowczyk, M., Gibson, A., & Tuma, A. (2016). On the Attractiveness of Product Recovery: The Forces that Shape Reverse Markets. *Journal of Industrial Ecology*, 980-994

customers do not realize their role as suppliers in the reverse marketplace, thus “the collection of goods from the marketplace is a supply-driven flow, rather than a demand-driven flow” (Stindt, et al. 2016, p. 982, in Guide et al. 2000, p. 137). Moreover contracting can become difficult in so a heterogeneous market. Another issue is that while forward markets are defined in accordance to a category of products, reverse markets are defined by the specific product or material needed for the recovery. Therefore the authors propose a different model to assess the Reverse Market’s Attractiveness, whose forces are: access to recoverable products, threat of independent recovery companies’ market entry, rivalry for recoverable products, adverse effects on core business and remarketing opportunities.

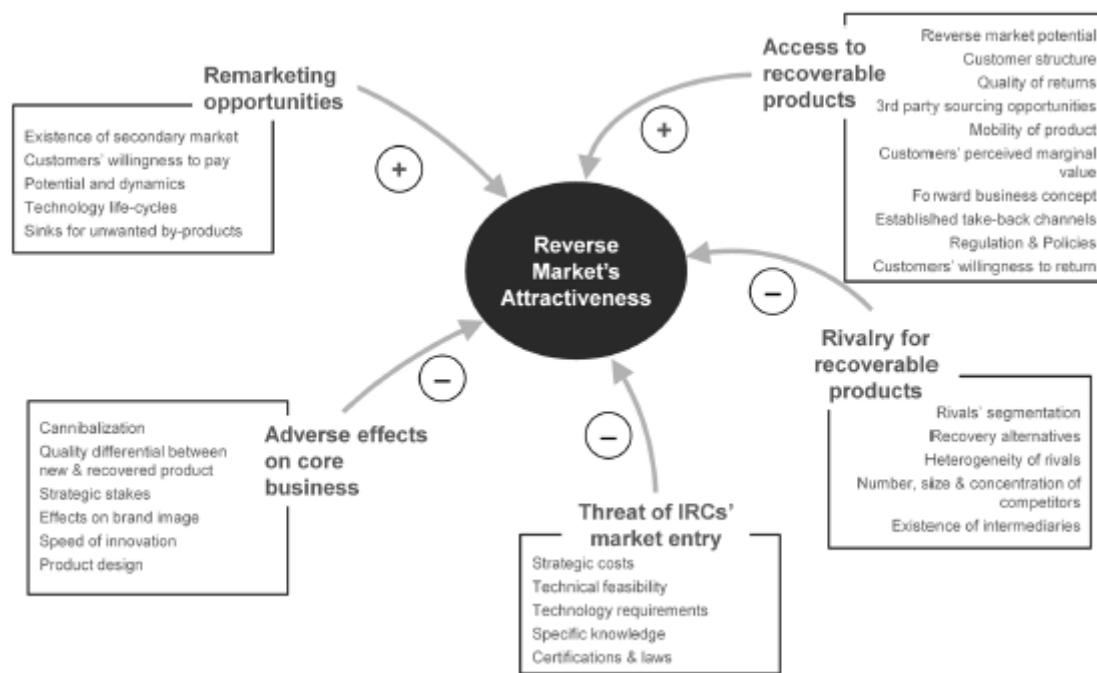


FIGURE 17 "REVERSE FIVE FORCES MODEL" FROM (STINDT, ET AL., 2016)

#### *Access to Recoverable Products*

This force positively (+) contributes to a reverse market’s attractiveness and its factors are: Reverse market potential, that is the complex number of End of Life/Use items in the reverse market.

Customer Structure, it means the level of fragmentation of the demand, in particular this is limited in B2B rather than B2C, because the first one deals with more



important quantities and at the same time it concentrate its activity in selected sites, while the latter segment can be more dispersive.

Quality of returns: this factor is affected by product design, degree of degradation and how much a product has been used. This risk can be limited by the presence of:

Third-party sourcing opportunities: acting as intermediaries. This figure is more likely in the market of commodities, for example metals and plastics.

Mobility of a product: it refers to the ease of transportation, but also the level of dissipation; for example, light products such as mobile phones are easy to carry, but at the same time they can be ruined through utilization. Dissipation besides affects: Customer's perceived marginal value of a recoverable product.

(Dominant) forward business concept of OEMs: it can limit the access of goods in the reverse market.

Established take-back channel.

Regulation and policies: laws can restrict the access to particular products, and at the same time drive customer's demand of returned products.

#### *Threat of Independent Recovery Companies' (IRCs) Market Entry*

This force deter (-) new entrants in the reverse market, and it represents the barrier posed to IRCs, for example the need for a reverse structure to put in practice reverse logistics activities but also the investment necessary to create one "from scratch". Factors influencing this force are:

Strategic costs: are the costs supported to invest in the reverse network that can turn to be unsustainable for IRCs that do not enjoy the economies of scale of OEMs.

Technical feasibility: some items are difficult or impossible to recover, for example breaking chemical bonds. At the same time certain goods are difficult to recover from a financial point of view, in fact it can happen that OEMs deliberately impose monopolistic price for spare parts in order to deter new entrants.

Technology requirements: IRCs can be excluded from reverse markets because they do not have the suitable technology to deal with it.

Specific knowledge: certain goods require a specific know-how, for instance because of their composition or because they require an ad hoc expertise.

Certification and law: certifying body are trusted by consumers and companies not certified can face a barrier.

### *Rivalry for Recoverable Products*

This force negatively affects a reverse market's attractiveness. It represents the competitive arena of a certain market. It is difficult to assess rivalry in the reverse market because the actor's role is not very clear: "*rivalry in reverse markets centers on demand for the same kind of recoverable product and rivals can include OEMs, IRCs, waste brokers, nongovernmental organizations (NGOs), and second-hand trading businesses*" (Stindt, et al. 2016, p. 987 in Knemeyer et al. 2002). The forces that affects rivalry for recoverable products are: Rivals' segmentation: evaluating rivalry requires a deep understanding of the different players' business model; in order to do so it should be analyzed competitors' segments and their objectives.

Recovery alternatives: Segments and business models are influenced by the availability of recovery alternatives, rivalry may vary according to stated quality levels.

Heterogeneity of rivals: is the "*diversity among the actors that originate reverse market demand*"<sup>290</sup>; this factor can discourage new entrants because it implies greater efforts in the competition 'analysis. This factor can be explained by: Number, size & concentration of competitors.

Existence of intermediaries: brokers and public waste collection agencies; this institutions are usually preferred than IRCs.

### *Adverse Effects on Core Business*

It is a further dissuading force to the reverse's market attractiveness and represents "*the interplay between primary and secondary products*"<sup>291</sup>; meaning the impact that product

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<sup>290</sup> (Stindt, et al. 2016, p. 988)

<sup>291</sup> Idem.

recovery may have on primary markets. Factors influencing adverse effects on core business are:

Cannibalization: it refers to the sales 'contraction of a product as a consequence of the launching of a new product (in this case a remanufactured product) by the same manufacturer.

Quality differential between new & recovered product (perceived): this factor influences cannibalization. If the differential is limited, this will not cause problems to the manufacturer, because customers see the two products as perfect substitutes; if this is not the case, the high differential can lead clients to refuse to pay for a remanufactured product. What is interesting is that OEMs can voluntarily decide to sell on the market products with high quality differential as strategic stakes.

Strategic stakes: OEMs may decide for this strategy just to dissuade third-parties to enter that market.

Effects on brand image: in certain cases recovering products may have a negative impact on a brand image by discrediting the quality associated with the brand.

Speed of innovation: it is negatively correlated to the possibility of new products to be remanufactured, for instance "*less-frequent innovation in a primary product increases the time frame during which recovered product can be remarketed*"<sup>292</sup>

Product design: design of primary products affects "*the cost of their disassembly, component inspection and repair, remanufacturing and recycling*". (Stindt, et al. 2016, 988, in Chung and Wee, 2008, p. 528)

### *Remarketing Opportunities*

This last force positively contributes to reverse market's attractiveness. Its factors are:

Existence of a secondary market: this is an essential element, as the decision to enter the remanufacturing market lays on the opportunity to make a profit. Secondary markets can be internal or external.

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<sup>292</sup> idem

Customers' willingness to pay: it is based on the judgement consumers have of the quality of recovered products, but also on the price of raw materials.

Potential and dynamic: attention must be given to market that have not fully evolved.

Technology life-cycles: products belonging to "old" productions can be remarketed to certain customers segments, for instance the so-called laggards, or as spare parts.

Sinks for unwanted by-products: unwanted products are "*non-focal product types, focal product types that do not satisfy quality requirements, and by-products generated by reprocessing*" (Stindt, et al. 2016, p. 989, in Knemeyer et al, 2002). Adequate sinks influence costs as they can both create new costs (dissipation of toxic substances in cathode ray tubes) or generate profit (sale of cardboard). (Stindt, et al., 2016)

Empirical evidence on remanufactured products 'attractiveness

Abbey and colleagues<sup>293</sup> - by reporting the results of a test aiming at disclosing which characteristics customers attribute to remanufactured products, found out that customer's education on remanufactured product can enhance their willingness to buy this kind of goods.

The first study ask to a group of respondents to spontaneously express words that they associate with remanufactured product, what emerged was that people did not have a clear idea on the concept of remanufacturing; the test delivered this words: "*unreliable, used, worn, broken, garbage, cheap, dirty, faulty, dangerous*". Another group of participants delivered this result: "*better, redesigned, good value, enhanced, renewed and improved*". The prevailing words were: "*used, old, broken, and dirty*", however no result led to the words "*environmental*" or "*green*".

In a second study it was asked to rate both new and remanufactured goods, with the aim of understanding how attributes, namely – price discount, brand equity and quality, negative attributes and green attributes and beliefs, impacted remanufactured products' attractiveness; they based their two studies in the field of technology, household and personal care product.

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<sup>293</sup> Abbey, J. D., Meloy, M. G., Guide, V. J., & Atalay, S. (2014). Remanufactured Products in Closed-Loop Supply Chains for Consumer Goods. *Production and Operations Management*, 488-503.

The study brought the following results:

Technology product attractiveness: Price discount has a positive impact on this category, in particular this proved to be true for products with a low brand equity while detrimental for products with a high brand equity. Attractiveness was influenced mainly by quality attributes; discounting, interaction of discount and brand equity, brand equity, negative attributes and consumer greenness go behind.

Household product attractiveness: Household products' attractiveness is positively impacted by discounting, quality attributes, green attributes and consumer greenness; intuitively negative attributes have a negative influence on attractiveness. Brand equity seems to not have importance for this kind of products. Results on this category brought to the conclusion that it is affected first by quality attributes, then by product attractiveness, discounting, negative attributes, green attributes, and finally consumer greenness.

Personal care product attractiveness: discounting, quality attributes, negative attributes and consumer greenness impact this kind of products. Green attributes and brand equity do not impact this category of products.

This product is greatly affected by quality attributes, discounting, negative attributes and consumer greenness.

<b>Product/ variable</b>	<b>Price discount</b>	<b>Brand equity and quality</b>	<b>Negative attributes</b>	<b>Green attributes and beliefs</b>
<b>Technology products</b>	+	<i>+ for low brand equity, - for high brand equity</i>	-	<i>No impact</i>
<b>Household products</b>	+	<i>No impact</i>	-	+
<b>Personal care products</b>	<i>+</i> ( <i>less important than other products</i> )	+	-	<i>No impact</i>

FIGURE 18 PRODUCT'S ATTRIBUTE IMPACT IN DIFFERENT MARKETS BASED ON (ABBEY, MELOY, GUIDE, & ATALAY, 2014)

Price discount was relevant in all categories but more nuanced in the personal care products market; according to Abbey et al. (2014), *"over-discounting could actually exacerbate the negative perceptions of remanufactured products"*<sup>294</sup>. Negative attributes were significant in every category, but particularly for personal care products where dirty and disgusting definitions are eloquent indicators of the products' lack of attractiveness.

Green attributes and beliefs was the less impactful parameter on the products attractiveness; this is an important findings as *"much of the CLSC literature takes for granted that consumers should perceive remanufactured products as green"* (Abbey, Meloy, Guide, & Atalay, 2014, p. 501). With regard to brand equity (associated with quality) it appeared that it negatively influence remanufactured products' attractiveness, even if this indicator was significant only for remanufactured technology. A managerial implication of this data is that *"original brand remanufacturing, as opposed to third party remanufacturing, can be deleterious to the attractiveness of the original brand as a whole"*.<sup>295</sup>

Educational information on remanufacturing has proved to be a successful tool to reduce the negative perceptions that customers have on remanufactured products, therefore companies should invest in clients' education.

It is worth to deepen the understanding on the willingness to pay for remanufactured products as it is associated to consumers with a lower willingness to pay, however according to Atasu et al.<sup>296</sup> (growing) niche of environmentally-friendly consumers is interested in remanufactured products, therefore the two segments should be directed with two distinct marketing strategies.

The authors started their analysis from the assumption that consumers esteem remanufactured products less than original ones because they value a lower value or believe that manufacturers have smaller costs by restoring used part and therefore their willingness to pay diminishes. It has been empirically found out that customers

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<sup>294</sup> (Abbey, Meloy, Guide, & Atalay, 2014, p. 500)

<sup>295</sup> Idem. P. 499

<sup>296</sup> Atasu, A., Van Wassenhove, L., & Miklos, S. (2009). Efficient Take-Back Legislation. *Production and Operations Management*, 243-258.

will be willing to buy remanufactured (and increase their willingness to pay) products only if they are adequately informed about their environmental impact, but also if it has the same functional characteristics of original items. Moreover, customers' willingness to pay is also affected by the proportion of remanufactured components in the product, but also the name of the remanufacturer has a great impact on that (as already discussed).

## 6. COPING WITH EPR LEGISLATION

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### A. OVERVIEW OF TAKE-BACK PRINCIPLES

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Over the last 60 years<sup>297</sup> the industrial mantra has been to limit the material input (so to limit costs) in order to create cheaper products that can be replaced once they reach their end-of-use/life, rather than being restored. Shorter life cycles and the fast pace of evolution is having dramatic consequences in the raising of waste, in particular e-waste. Municipalities are not ready to deal with that because electronic items contain toxic materials (like mercury, cadmium, lead), besides their recovering can appear as unprofitable.

The increasing volume of electronic waste (influenced by increased consumption and shortened life cycles) made the number of environmental laws growing; producers have to pay for collection and recycling – this is known as the concept of extended producer responsibility.

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<sup>297</sup> See: Souza, G. (2012). *Sustainable Operations and Closed-Loop Supply Chains*. Business Expert Press.

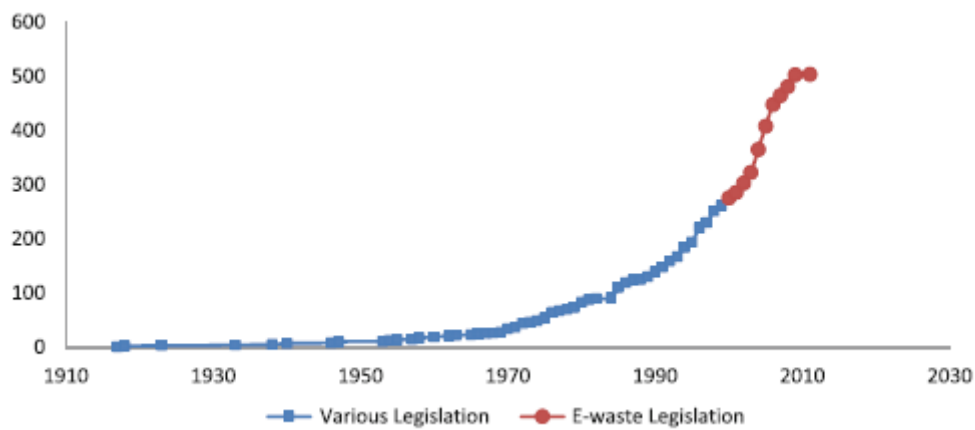


FIGURE 19 DIFFUSION OF INTERNATIONAL ENVIRONMENTAL LEGISLATION. FROM (ATASU, WASSENHOVE, & WEBBER, 2016)

This is the reason why take-back legislation has been imposed. This body of legislation is based on the principle of Extended Producer Responsibility (EPR) which makes producers both financially and physically responsible for the environmentally-friendly disposal of their products once they have reached their end-of-life. Take-back directive principles can take the following configuration:

- Consumer pays principle: *“the end-user is directly charged for the costs of environmentally sound treatment of used products”*<sup>298</sup>
- Producer pays principle: *“the manufacturer is responsible for the environmentally friendly treatment of end-of-use products at no cost to end user”*<sup>299</sup>

Environmental economists study socially optimal legislation to implement EPR. “Different EPR policy tools can be implemented: *advance recovery fees (ARFs), recycling subsidies, unit-based pricing, take-back mandates, and recycling rate targets*”<sup>300</sup>.

‘ARFs’ *“is a fee collected from consumers or producers for recycling of the products they purchase or sell”*<sup>301</sup>. This tax is charged on consumers when they purchase goods and on

<sup>298</sup> Atasu, A., Van Wassenhove, L., & Miklos, S. (2009). Efficient Take-Back Legislation. *Production and Operations Management*, 243-258. p.243

<sup>299</sup> Idem.

<sup>300</sup> Ferguson, M. E., & Souza, G. C. (2010). A Commentary on Closed Loop Supply Chains. In M. E. Ferguson, & G. C. Souza, *Closed-Loop Supply Chains. New Development to Improve the Sustainability of Business Practices* (pp. 1-8). CRC Press.

<sup>301</sup> Ferguson, M. E., & Souza, G. C. (2010). A Commentary on Closed Loop Supply Chains. In M. E. Ferguson, & G. C. Souza, *Closed-Loop Supply Chains. New Development to Improve the Sustainability of Business Practices* (pp. 1-8). CRC Press



producers when they sell them and its usually applied on a unit weight sold basis. The idea behind is that with ARF production and consumption will decrease and as a consequence less raw material are used, but also it can affect the design of the products if it charges the weight of the products.

'*Recycling subsidies system*' indirectly supports product design but it is difficult to implement because it requires funding from the public.

'*Deposit/refund system*' implies a fee on production/consumption from one side and a subsidy to recyclable products from the other. This system would foster recycling and lessen virgin materials consumption, but also improve DfE. Recycling of subsidies can be financed through the fees collected.

'*Recycling targets*' "*is the proportion of product sold that needs to be recycled and it is set by the policymaker*"<sup>302</sup>. It can consist in a scheme that consents producer that have not reached the target to buy credit from other producers. It gives incentive to producers to eco-design, but it needs a take-back organization to handle it and this can imply transaction costs.

Unit-based fee policy "*charges te end user for the cost of recycling*"<sup>303</sup>. This model reduces the use of raw materials but can lead to illegal dumping.

What is evident, is that despite scholars have delivered socially optimal legislation, they have not been implemented. Reason can be that it may be expensive to deal with a deposit/refund model, but also it must be aware that industries lobby for law requiring minimum costs for them.

Atasu et al. <sup>304</sup>claim there can be two EPR models: a tax model and a recovery target rate model. The first model requires the social planner to impose producers or purchasers a unit tax and takes responsibility for collection and recovery. The second model imposes on the producers both physical and financial constraints as it sets targets for manufacturers and this model is applied in Europe. Even if industry complain about this model, the authors claim that this can help reducing their operating costs comparing to the ones under a tax model.

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<sup>302</sup> idem

<sup>303</sup> idem

<sup>304</sup> See 296

Subramanian et al (2009)<sup>305</sup> state that product take-back legislation would improve the useful life of products and therefore reduces e-waste, though raising manufacturers profits.

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B. DRAWBACK OF EPR LEGISLATION. COLLECTIVE OR INDIVIDUAL  
EPR?

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*“Extended Producer Responsibility (EPR) is a policy tool that holds producers financially responsible for the post-use collection, transportation, and processing of their products”*<sup>306</sup>

Operationalize an EPR system is expensive and therefore there has been an attempt by producers, architects, enforcers and operators of this tool to minimize its implementation cost, that has been translated into the creation of collective systems where waste coming from different manufacturers is collected and processed jointly. However under Individual Producer Responsibility plans, producers who invest in recycling technology will face cheaper costs of recycling, while in collective systems there is no incentives to invest in those technologies.<sup>307</sup>

EPR has been criticized because of its weight-based proportional cost allocation criteria and therefore all producers *'pay the same per unit-cost'* whether or not they have performed a good design and making certain manufacturers opting out for an individual system. This fragmentation, on the other hand, results in a general cost inefficiency.<sup>308</sup>

Positive aspects of collective EPR schemes is that they get economies of scale because of shared facilities but also because together they obtain lower prices by service providers.

In general a producer decides to enter a collective system, only if the collective cost is inferior to the stand-alone cost that is *“the cost that a producer or a producer group can achieve in an independent plan”* <sup>309</sup> namely it should be guaranteed *'group incentive compatibility'*.

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<sup>305</sup> In (Ferguson & Souza, 2010)

<sup>306</sup> Gui, L., Atasu, A., Ergun, Ö., & Toktay, L. (2016). Efficient Implementation of Collective Extended Producer Responsibility Legislation. *Management Science*, 1098-1123. P. 1098

<sup>307</sup> (Souza, 2012)

<sup>308</sup> (Gui, Atasu, Ergun, & Toktay, 2016)

<sup>309</sup> (Gui, Atasu, Ergun, & Toktay, 2016, p. 1099)

Cost allocation by return share does not guarantee group incentive compatibility, unless two kind of adjustment are implemented: 1. a collective system taking into consideration the processing cost differentials among goods, 2. reward manufacturers who add value to the collective system.

The findings of this research suggest that *“the collective system with cost allocation by return share could charge these defecting producers up to \$30 million more than their actual end-of-life burdens, providing strong incentives for breaking away... by ensuring group incentive compatibility, (however) can retain these producers in the statewide collective system and prevent an efficiency loss from fragmentation of 5-20% for Washington, which translates in \$0.35-\$1.42 million of opportunity cost. This cost efficiency improvement would amount to approximately \$16-\$65 million for the electronics industry in the United States.”*<sup>310</sup>

Implementing the EPR principle is resulting to be challenging because of its high cost; for this reason at the operative stage, great attention is given to cost-efficiency that leads to the creation of collective facilities dealing with EPR working with a variety of waste coming from different manufacturers.

The authors claim that collective implementations may obtain greater design policies compared to individual ones, but this can be achieved just if certain infrastructural characteristics, called as *‘design-reinforcing conditions’* exist. Those conditions are the presence of processing technology efficiency or product recyclability and a network that leads to cost reduction. In networks where the design-reinforcing condition is not fulfilled, the collective system is unstable and weakens the cost efficiency advantage of collective networks.

Design-reinforcing conditions will rise in recycling network where heterogeneous recycling technologies are part of a competitive market and the cost of technology is not too high. *“For a cost allocation to be design-effective, it needs to properly capture how the available processing technologies respond to design improvements in the collective RN”*<sup>311</sup>. Better design incentives are gained in a collective system through an individual rational cost allocation; if this is not the case it would be preferable to keep a cost-effective

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<sup>310</sup> (Gui, Atasu, Ergun, & Toktay, 2016, p. 1111)

<sup>311</sup> Gui, L., Atasu, A., Ergun, Ö., & Toktay, L. (2018). Design Incentives Under Collective Extended Producer Responsibility: A Network Perspective. *Management Science*, 1-22. P.16

collective system at the expenses of design for recyclability; another aspect to take into consideration is that the kind of technology and capacity available in the market, can be a design-reinforcing condition.

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### C. ROLE OF BUSINESSES IN THE POLITICAL ARENA

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It is important that firms take attention to implementation details of legislation; for example the WEEE Directive<sup>312</sup> has created discontent<sup>313</sup> as it is described as a competition distorter and to favor certain producers because it uses market share to allocate recycling costs instead of current return share.

According to Atasu et al. (2016) it can be evaluated how much companies are subjected to burdensome legislation, and they depict a framework that can help companies to take advantage of environmental laws.

The potential impact of environmental laws depends on: market share, margins and the environmental attributes of a product. For example the impact of environmental law is greater if the company's market share is higher, its margins lower and its products characterized by inferior environmental attributes. Greater companies are supposed to react faster because environmental law affects them in a great way; in the same position could be industries with little margins.

*Potential Impact = Market Share \* Environmental Impact / Profit Margins*

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<sup>312</sup> WEEE Directive Series INSEAD: a forum composed of producers, treatment providers, legislators, green group and academics.

Issues that emerged:

1. Targets: collection and recycling targets were obtained through lobbying by both producers and green organizations (who teamed with treatment providers). Targets are deemed as unclear.
2. Product categorization: WEEE targets are based on the weight of the products rather than their environmental hazard therefore it is not sure the producers would design eco-friendly products.
3. Individual Producer Responsibility: Manufacturers prefer collective systems in order to get scale economies and have formed collective take-back systems (European Recycling Platform 2007) mandated to third parties and where cost allocation is made on a weight-based criteria.
4. Fairness: fear of the existence of free riders.
5. Collection assurance: who is in charge to pay the 4kg per capita collection target?

(Atasu, Van Wassenhove, & Miklos, 2009, p. 244)

<sup>313</sup> (Atasu, Wassenhove, & Webber, 2016)

Risk experience is affected by a company's global presence and its product portfolio. For example multinationals that have lived the consequences of the WEEE Directive in Europe have more experience when they will deal with that in other countries.

$$\text{Risk of an Unpleasant Surprise} = \frac{\text{Market Share} * \text{Environmental Impact}}{\text{Profit Margins} * \text{Global Presence} * \text{Diversity of Portfolio}}$$

Considering that policies can favor certain companies while harming others, firms should collaborate in the policy making process if they do not want to be affected, but it seems that many companies do not do that.

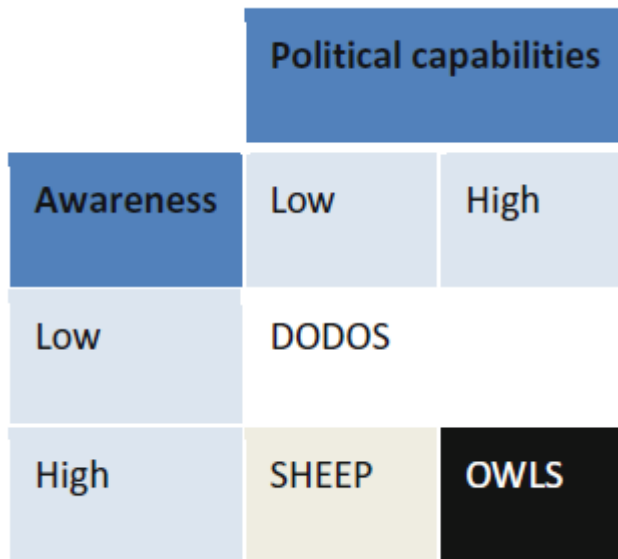


FIGURE 20 FIRMS AS POLITICAL ACTORS (ATASU, WASSENHOVE, & WEBBER, 2016)

Dodos are likely to be smaller firms, even though also big firms like Sony Corporation and Palm Inc can be labelled as such. The first one failed to comply with European laws because of the high level of cadmium in PlayStation, while the latter because it did not respect the EU's Directive on the Restriction of Hazardous Substances (RoHS). Dodos can risk extinction because they ignore or are unaware of “*environmental concerns or associated regulation*”.<sup>314</sup>

<sup>314</sup> (Atasu, Wassenhove, & Webber, 2016, p. 188)

Sheep are firms that become aware of environmental legislation once it has been adopted and implemented and assume a “*comply and complain*” attitude, as they are not capable “*of informing the environmental policy-making process, let alone influencing it*”.<sup>315</sup> Owls are companies aware of the incoming environmental laws and who get involved in lobbying activity. To be an owl a company necessitates to be politically competent.

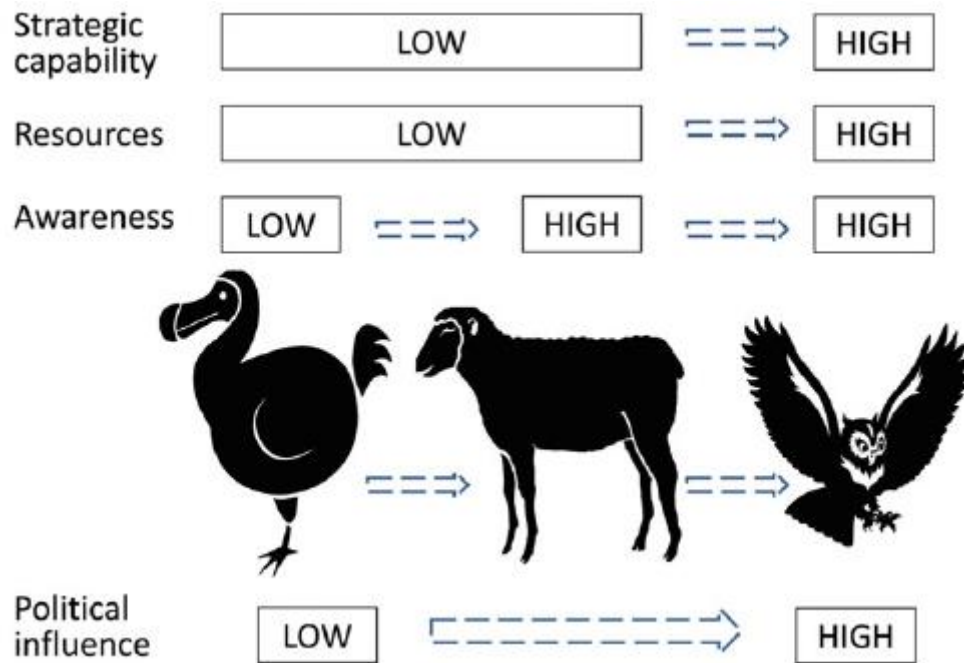


FIGURE 21 COMPONENT OF EFFECTIVE POLITICAL ACTION FROM ATASU ET AL. (2016)

Political competence requires:

- Awareness: companies should be aware of the consequences of environmental policies at present time and in the future; this allows them to “*coordinate, mobilize and deploy*”<sup>316</sup> to the aim of exerting political influence.
- Resources: human, financial, reputational resources, but most importantly political expertise and knowledge
- Strategic political capability: companies need a long-term strategy if they want to be actively involved in the political debate.

<sup>315</sup> idem

<sup>316</sup> (Atasu, Wassenhove, & Webber, 2016, p. 192)

Large companies are likely to have awareness; large companies with a thin product portfolio however have to take into consideration that what is happening in other industries can affect them in the future. Small companies should form alliances in order to deal with developing environmental legislation.

Political knowledge and competence is based on a political network, useful to get political information, but also on the ability to process those information, evaluating its meaning and potential consequences and the creation of a collective political memory, useful when a political problem appears.

Developing and executing a political strategy implies:

- Setting a company's goals: trying to be defensive, i.e. defeating proposed legislation, or to be offensive, that is framing legislation in a way that suits a company's interest. Firms need also to compare the trade-offs, but also to be flexible according to what is politically suitable over time.
- Creating coalitions: companies should understand who can support and on the contrary who can oppose them. This is a crucial aspect to take into consideration, in fact during WEEE negotiations certain companies believed environmental NGOs were their opponents instead of competing firms, while owl firms, though formally supporting environmental causes were pursuing their interests.
- Targets: it is necessary to identify who are the decisive actors during the negotiation.
- Timing: politically influential firms are always alert on dangers and opportunities posed by political actors and are ready to take advantage of it.
- Communication channels: it is necessary to appeal mass media, who have the position to communicate to key decision-makers.
- Content of the message: it must be as credible and consistent as possible in order for reputational reasons.

It has to be kept in mind that according to geographical location effective political strategies can vary; lobbying tactics differ from the US, where they are usually more aggressive than in the EU, where it is more subtle.

## CHAPTER 3: BUSINESS CASES

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### 1. Ecopneus SCPA, Italy, (EU)

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Ecopneus SCPA (stands for ‘*Società Consortile per Azioni*’ an Italian legal form hybrid between a cooperative and a joint stock company) was founded in 2011 by the leading tyre producers and importers working in Italy (Bridgestone, Continental, Goodyear-Dunlop, Marangoni, Michelin and Pirelli) in partnership with a number of smaller tyre manufacturers and importers. Its objective is to provide to the stockholders the tracking, collection, processing and final destination of end-of-life tyres (ELTs), moreover it fulfils the duty of reporting to the Authorities.

The creation of Ecopneus is the result of the implementation of Art. 228 of Italian Legislative Decree 152/2006 that imposes on tyre manufacturers and importers the obligation to dispose of end-of-life tyres. This must be done on a weight-basis, meaning that the total weight placed on the Italian replacement market must be managed by the producer by the following year, in accordance with the principle of Extended Producer Responsibility. The same article, amended by art. 32 of Legislative Decree 205/2010, whose legal basis is the Directive 2008/98/EC on waste - requires implementing the most up-dated technologies as well as pursuing research, development and educational activities in order to guarantee the most optimal output. The legislative decree was put into effect by the Ministerial Decree of 11th April 2011 n. 82, which established for the first time a national ELTs recovery system. As of a rule lauched in summer 2015 the responsibility for the correct disposal of tyres is extended to subjects legally referable for the generation of waste, for instance the person asking for tyre replacement.

The Italian law accepts both individual or collective systems; it is evident that Ecopneus is a collective system because of its partnership nature; all the partners fund the system through an annual contribution charged to the final user to be priorly accepted by the Italian Ministry of the Environment and subject to VAT as of the requirements of Art. 228 - 152/2006.



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## A. BUSINESS MODEL

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Ecopneus represents an excellent example of a reverse supply chain, moreover it takes part of a network of enterprises forming a closed-loop supply chain.

Decision making is centralized and it is established in the headquarters of Milan, in Lombardy. The management is composed by 10 people plus the board; the reason of that is to keep a lean and responsive structure; the remaining working force is externalized.

Ecopneus' supply chain is managed through the use of an internal software: the first step is made by the tyre-specialist who makes a request for take-back through the software; ELTs take-back is carried out by private companies (Collectors) with which Ecopneus has entered into a regular service contract, directly at the tyre-shop; once ELTs are collected they are stored at the Collectors' warehouses and then sent to third parties companies for shredding activities; in this phase ELTs are chopped until the different parts of the tyre (rubber, steel and textile fibre) are obtained. The 'chopping' activity is divided into two streams: the first one results in the production of shred tyres that will be used as an alternative fuels for cement plants ovens, paper mills, waste-to-energy plants; the second stream produces rubber granulates of different granulometries, at the end of this process ELTs become secondary raw materials (here the responsibility of Ecopneus ends) and can be sold by the producer (that therefore keeps the profit).

The entire process is traced through Ecopneus's internal software, the partners along the supply chain indeed have access to it even if just with regard to the necessary activities and they provide the information required by the law, that is with regard to collection, transportation and shredding. At this point the material recovered is managed by Ecopneus suppliers that could be either sold as it is or used to manufacture in-house new products, for instance modified asphalt, sport surfaces (volleyball, football, basket and horse-riding); in the building industry (rubber is recovered as acoustic insulator but also to prevent the formation of

bacteria); a further use of ELTs is the usage of the so called “shred” as TDF (Tired Derived Fuel) that is mainly used in cement plants or power plant in substitution of certain fossil fuel (like pet coke) in order to produce energy..

According to the company Operation and Logistic manager David Denti - that agreed to be interviewed, the most challenging phase for Ecopneus was the beginning, because of the difficulties of starting from scratch a new activity, however thanks to the proactivity of its suppliers, they managed to become the leaders of the market (65% of the total share, competitors are disseminated) even though the company’s mission is not to earn a profit but to offer a service to its partners. The reason of this success lays on the nationwide network of drivers that permits to provide an excellent and flexible service even to the most remote villages and islands but also to the main cities that because of traffic reason are difficult to reach; for instance the historical center of the city of Genoa cannot be served by TIR trucks because of its tight streets (carrugi) and therefore the service is made by vans. A further obstacle is the presence in the most important cities of controlled traffic zones (ZTL – zona a traffic limitato), that are areas (usually located in historical centers) that limit the circulation of certain vehicles because of their weight and/or emissions; in order to respect ZTL’s requirements, for instance the city of Milan is served by diesel vehicles.

A further reason for Econpneus success is that its suppliers have a constant revenue that from one side leads to investment in machinery and workers’ education and from the other permits to obtain economies of scale that impact on the environmental tax imposed on final users; moreover the collection rate is 7-12% above the target imposed by the law. A thorough control of costs is a additional reason for Ecopneus accomplishments.

Ecopneus’ management is moreover engaged in a permanent dialogue with the institutions and the government, aimed at bringing tangible benefits to the entire supply chain. Examples can be the request to the government to make use of its

monitoring power to verify that the actors involved in ELTs supply chain are compliant with the legislation.

In conclusion, Ecopneus' engagement to the Circular Economy principles is absolute as it (almost) closes the loop of ELTs by valuing them, proving that a legislative constraint can transform itself to an opportunity for the development of a new market, namely the one of recovered products and therefore 'boosting' job creation with cascading benefits for the entire economy.



FIGURE 22 “COLLECTORS' NATIONAL ALLOCATION”. FROM [“HTTPS://WWW.ECOPNEUS.IT/EN/ELT-RECYCLING/THE-SUPPLY-CHAIN/OPERATORS-MAP/”](https://www.ecopneus.it/en/elt-recycling/the-supply-chain/operators-map/) UPDATED ON 2<sup>ND</sup> JANUARY 2019

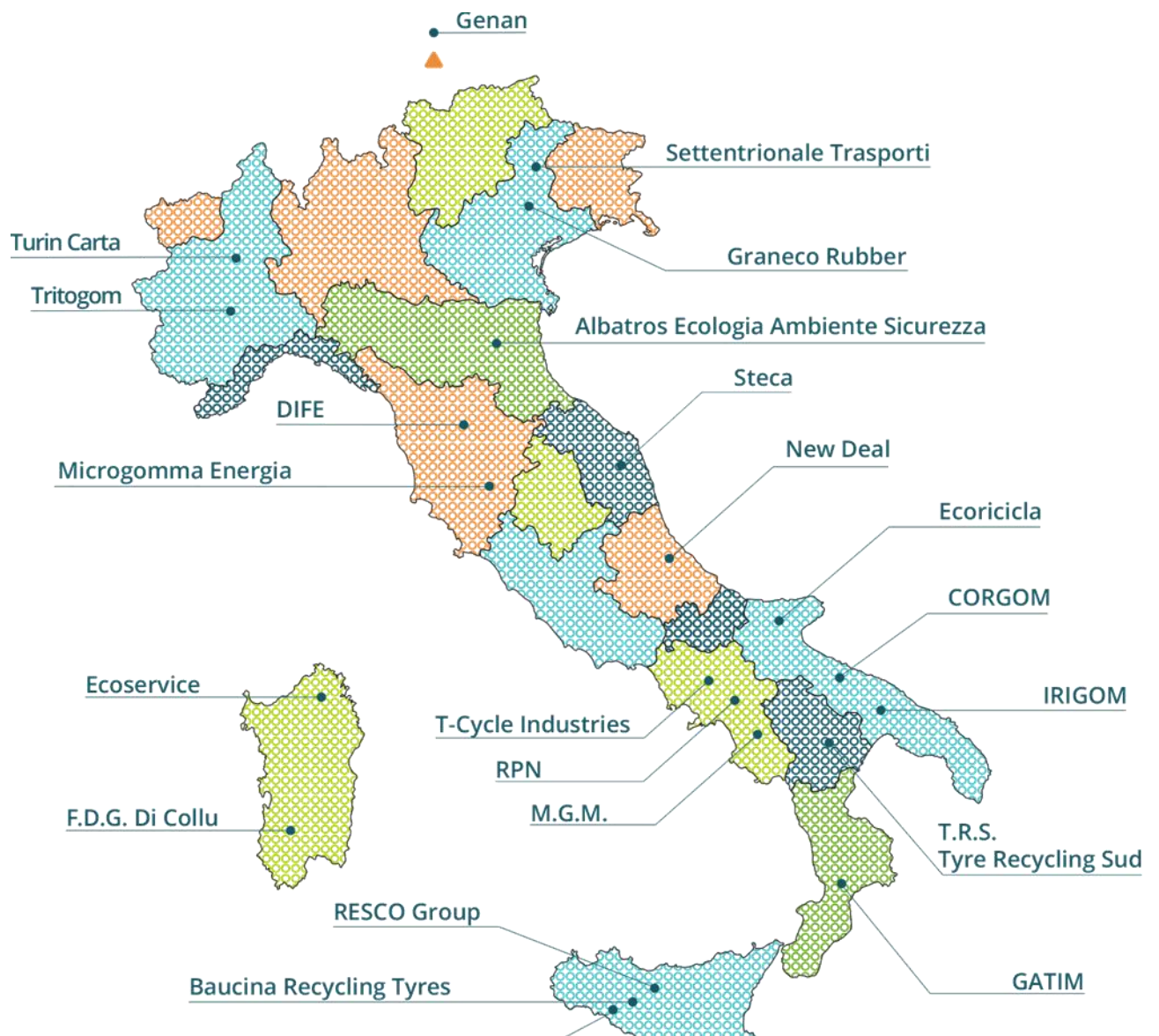


FIGURE 23 SHREDDERS' NATIONAL ALLOCATION. FROM "[HTTPS://WWW.ECOPNEUS.IT/EN/ELT-RECYCLING/THE-SUPPLY-CHAIN/OPERATORS-MAP/](https://www.ecopneus.it/en/elt-recycling/the-supply-chain/operators-map/)" UPDATED ON 2<sup>ND</sup> JANUARY 2019

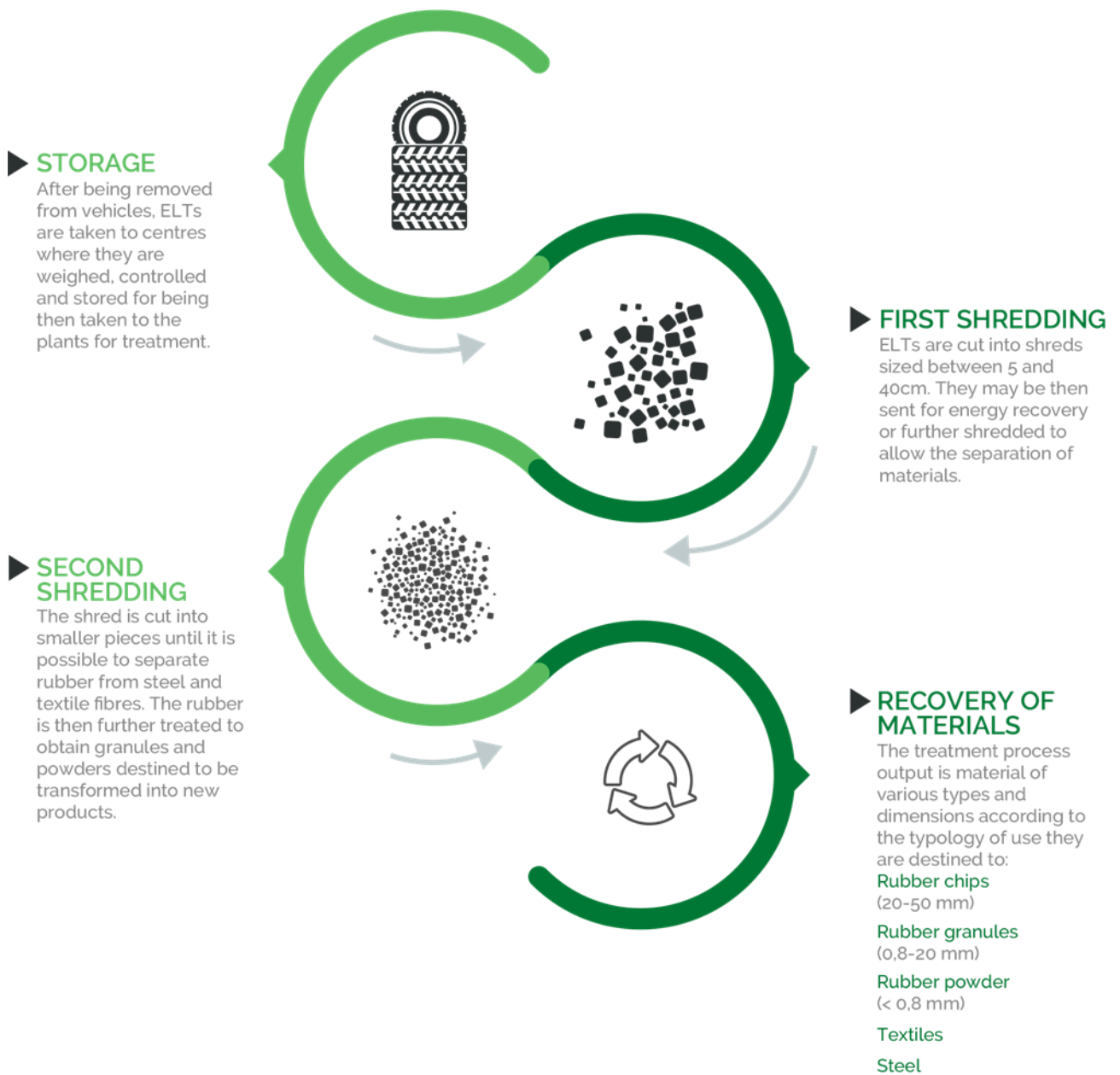


FIGURE 24 ELT'S DISPOSAL. FROM "[HTTPS://WWW.ECOPNEUS.IT/EN/ELT-RECYCLING/END-OF-LIFE-TYRES/RECYCLING-AND-RECOVERY-OF-ELTS/](https://www.ecopneus.it/en/elt-recycling/end-of-life-tyres/recycling-and-recovery-of-elts/)" VIEWED 31ST DECEMBER 2018

## 2. LIGHT RECYCLE WASHINGTON (USA)

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LightRecycle™ is the lights take-back program of PCA Product Stewardship INC. (PCA) a non-profit Canadian-based industrial organization that takes care of product stewardship activities for manufacturers, distributors and retailers of products subjected to EPR legislation in Canada and in the United States.

Washington State Law<sup>317</sup> imposes the correct disposal of mercury-containing lights in order to prevent mercury releases in the environment. Mercury, in fact leaks from broken lights and due to its vapor nature it can spread in the ecosystem.

LightRecycle™ Washington program started on January 1, 2015 and provides EPR services to its Washington participants; it comprehends “*retailers, municipal waste facilities, collection events and residential curbside collection*”<sup>318</sup> (The program is funded through an Environmental Handling Charge (EHC) of \$ 0.95/light added to the cost of lightings and therefore to the final user. This charge does not represent a government tax and it is regarded as part of the cost of product and produces a sales tax; the seller may or not show the EHC; this revenue pays oversight on the program (less than one full time person).

Consumers can deliver their rejected Compact Fluorescent Lights (CFLs) and High Intensity Discharge (HID) lights at Light Recycle<sup>319</sup> Washington; then they are shipped to an EPA-regulated processor for recycling: lights are crushed and components separated.

End of life bulbs are recovered as secondary raw materials and used as a feedstock of new products; however due to an excess of mercury in the US industry, this chemical, once it has been recovered, it is sent for “long term sequestration”, that means it is kept in a secure facility.

LightRecycle™’s operations are dealt with each supplier; the main concerns are the satisfaction of the collection sites and secondly cost control; the entire material flow is traced through spreadsheet.

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<sup>317</sup> Chapter 70.275 RCW MERCURY-CONTAINING LIGHTS

<sup>318</sup> From <https://www.lightrecycle.org/consumers/accepted-products/>, viewed January 3rd, 2019)

According to the LightRecycle's Washington Manager, that helped to clarify the information provided on the organization's website, they are currently facing a challenging phase because of a revenue shortfall due to the decline of CFLs. Fixing the finance mechanism through the legislature would be an answer, otherwise he envisages two difficult options for light manufacturers in the future: to finance the shortfall through debt or to run their own collection programs. Product Care has developed a certain political experience as they have been in the field for over twenty years. According to the interviewee, in fact it is important when working in such inter-institutional field to deal openly with problems when they emerge, to explain the actions implemented to resolve the issue and what need to be done in order to correct the problem; what is important to avoid is that negative whispers cause legislators to fear voting for new programs.

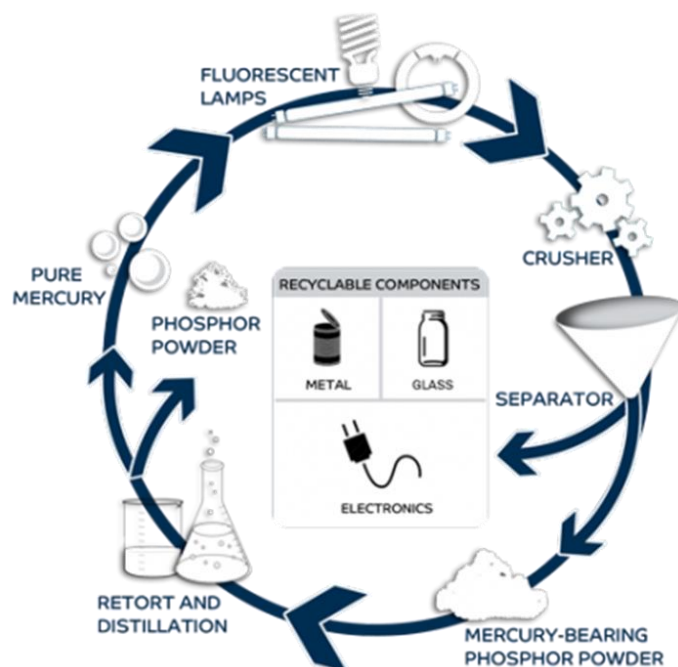


FIGURE 25 RECYCLING PROCESS OF A MERCURY-CONTAINING LIGHTS. FROM [HTTPS://WWW.LIGHTRECYCLE.ORG/ABOUT/](https://www.lightrecycle.org/about/) VIEWED 3RD JANUARY 2019



## CONCLUSION

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Businesses can be both environmentally and economically sustainable; in order to do so however, managers have to get out from their comfort zone looking for alternative business models.

States are implementing EPR legislation that impose on manufacturers the financial and technical duty for the proper disposition of production waste; EPR legislative body of the United States of America and of the European Union have been described and what emerged is that they have a different perspective on EPR. While in the United States *'Product Stewardship'* is regulated by specific product bills, mainly adopted at state level, in the European Union *'Extended Producer Responsibility'* is ruled by a framework legislation known as the *'Circular Economy Package'*, approved in 2018 which is part of a wider strategy aiming at shifting the European economy from a linear model to a circular one and which involves a network of enterprises, scientists, citizens and NGOs, including financial instruments in order to support this change. It can be claimed that this is utopia, in any case I argue that going beyond political slogans the scope of this strategy is still revolutionary although its success lays, in my opinion, on two fundamental conditions: first of all moving from a linear to a circular model requires the development of technologies that at present time cannot fully achieve the circular economy, moreover it can be debated that because of physical laws it is not possible to completely realize this pattern, indeed *"100% closed loop recycling is not thermodynamically practical"*<sup>320</sup>. In particular separating mixtures of substances requires an infinite amount of energy, meaning that certain materials are not accepted in closed-loop systems, moreover many products' composition is based on alloys; it is clear that this condition clashes with the functionality of several products. The second issue to take into consideration is that in order to fulfill a more sustainable economy both the industry and the civil society have to embrace it and this is not easy considering how our life-style (even if we are

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not aware of that) depends on the industrial exploitation of natural resources. Economic growth still depends on virgin materials, even in a closed loop economy, even though the effort towards an increased recyclability relieves the impact on the environment.<sup>321</sup>

According to the Ellen MacArthur Foundation the Circular Economy: “*remains eclectic and lacks a scientifically endorsed definition*”<sup>322</sup>, moreover, considering the inter-disciplinarity of this issue, there is need to a synergist communication between academic and non-academic actors, in both the field of science and law.

Despite this I posit that at least we can afford to develop different business models that can help to save precious resources; this is the case of Closed-Loop Supply-Chains, that have proved to be more environmental-friendly than traditional supply chains, preserving raw materials and at the same time have paved the way for the satisfaction of the needs of the segment of environmentally-concerned consumers with potential impact on their profitability.

Legal requirements have shown to have propelled the creation of this kind of ‘*Closed-loop*’ enterprise as do demonstrate the business cases described in Chapter 3, therefore I re-assert that provisions aiming at the protection of the environment can provide a business opportunity for those entrepreneurs that are able to find it.

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<sup>321</sup> idem

<sup>322</sup> Ellen MacArthur Foundation, Growth within: a circular economy vision for a competitive Europe, June 2015, p. 23.

## BIBLIOGRAPHY

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- Abbey, J. D., Meloy, M. G., Guide, V. J., & Atalay, S. (2014). Remanufactured Products in Closed-Loop Supply Chains for Consumer Goods. *Production and Operations Management*, 488-503.
- Abbey, J., & Guide, V. (2016). Consumer Markets in Closed-Loop Supply Chains. In A. Atasu, *Environmentally Responsible Supply Chains* (p. 3-17). Springer.
- Agrawal, S., Singh, R. K., & Murtaza, Q. (2016). Outsourcing decisions in reverse logistics: Sustainable balanced scorecard graph theoretic approach. *Resources, Conservation and Recycling*, 108, 41-53.
- Agrawal, V. V., Atasu, A., & Van Wassenhove, L. N. (2018). New Opportunities for Operations Management Research in Sustainability. *Manufacturing & Service Operations Management*, 1-12.
- Antonioli, M. (2018). La sostenibilità dello sviluppo tra principi del diritto, proceduralizzazione, eticità e crescita economica. *Rivista Italiana di Diritto Pubblico Comunitario*, 17-36.
- Atasu, A., & Van Wassenhove, L. (2010). Environmental Legislation and Product Take-Back and Recovery. In M. Ferguson, & G. Souza, *Closed-Loop Supply Chains. New Development to Improve the Sustainability of Business Practices*. (p. 23-38). CRC Press.
- Atasu, A., Van Wassenhove, L., & Miklos, S. (2009). Efficient Take-Back Legislation. *Production and Operations Management*, 243-258.
- Atasu, A., Wassenhove, L., & Webber, D. (2016). Owls, Sheep and Dodos: Coping with Environmental Legislation. In A. Atasu, *Environmentally Sustainable Supply Chains* (p. 179-197). Springer.
- Austin, A. A. (2013). Where Will All the Waste Go: Utilizing Extended Producer Responsibility Framework Laws to Achieve Zero Waste. *Golden Gate Univ. Environmental Law J.*, 6, 221-257.
- Barral, V. (2012). Sustainable Development in International Law: Nature and Operation of an Evolutive Legal Norm. *European Journal of International Law*.
- Beder, S. (2006). *Environmental principles and policies : an interdisciplinary introduction*. London: Sterling, Va. : Earthscan.

- Behrens, A., & Rizos, V. (2017). *The Interplay between the Circular Economy and the European Semester: An assessment*. CEPS Research Report No. 2017/16, December 2017.
- Bernard, A. (2017). Chemicals in material cycles: how EU law needs adjustments for the transition to an environmentally beneficial circular economy. *Environmental Law Network Internation (ELNI) Review*(2), 54-62.
- Bernon, M., Tjahjono, B., & Faja Ripanti, E. (2018). Aligning retail reverse logistics practice with circular economy values: an exploratory framework. *Production Planning & Control. The Management of Operations.*, 29(6), 483-497.
- Bjørn, A., & Strandesen, M. (2011). The Cradle to Cradle concept - is it always sustainable? *Poster session presented at The Life Cycle Management (LCM) conference: Towards Life Cycle Sustainability Management*. Berlin.
- Blackburn, J., Guide Jr., V., Souza, G., & Van Wassenhove, L. (2004). Reverse Supply Chains for Commercial Returns. *California Management Review*, 6-22.
- Blumberg, D. F. (2004). *Introduction to Management of Reverse Logistics and Closed Loop Supply Chain Processes*. CRC Press.
- Coly, R. A. (2012). Development and Implementation of the Polluter Pays Principle in International Hazardous Materials Regulation. *Environmental Claims Journal*, 24(1), 33-50.
- Commission, E. (2017, February 3). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. "*The EU Environmental Implementation Review: Common challenges and how to combine efforts to deliver better results*". SWD(2017) 63 final. Brussels.
- Corriero, V. (2016). The Social-Environmental Function of Property and the EU Polluter Pays Principle: the Compatibility between Italian and European Law. *The Italian Law Journal*(2).
- D'Addezio, M. (2017). Transizione verso un'economia circolare: diritto per l'agricoltura e coordinate costituzionali. Prime riflessioni. *Rivista di diritto agrario*, 1, 85-116.

- de Jesus, A., & Mendonça, S. (2017-18). Lost in Transition? Drivers and Barriers in the Eco-Innovation Road to the Circular Economy. *Science Policy Research Unit (SPRU) Working Paper Series*.
- De Leonardis, F. (2017). Economia circolare: saggio sui suoi tre diversi aspetti giuridici. Verso uno Stato circolare? Circular economy: essay on its three different legal aspects. Towards a circular State?]. *Diritto Amministrativo*, 163-207.
- Dimitrova, V., & Gallucci, T. (2017). Reverse Logistics and Circular Economy - Working Together? *Izvestia, Journal of the Union of Scientists*, 2, 13-20.
- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives. (s.d.).
- Douma, W. T. (2017). The Promotion of Sustainable Development through EU trade instruments. *European Business Law Review*(2), 197-216.
- Edizioni Ambiente. (2018). *Il Pacchetto Economia Circolare. Con la versione coordinata della direttiva Rifiuti*. (R. N. Ambiente, A cura di) Milano: Edizioni Ambiente.
- Ellen Macarthur Foundation. (2014). *Towards the Circular Economy. Accelerating the scale-up across global supply chains*.
- European Commission. (2016). *Cohesion Policy Support for the Circular Economy*.
- European Commission. (2016, November 22). Commission Staff Working Document. *Key European action supporting the 2030 Agenda and the Sustainable Development Goals Accompanying the document Next Steps for a sustainable European future: European Union action for sustainability*. COM(2016) 739 final. Brussels.
- European Commission. (2017, January 26). Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the implementation of the Circular Economy Action Plan. COM(2017) 33 final. Brussels.
- European Commission. (2018, January 16). Commission Staff Working Document. Report on Critical Raw Materials and the Circular Economy. SWD(2018)36 final. Brussels.

- European Commission. (2018, January 16). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. *on the implementation of the circular economy package: options to address the interface between chemical, product and waste legislation. COM(2018) 32 final*. Brussels.
- European Investment Bank. (2015). *Access-to-finance conditions for Projects supporting Circular Economy*. EIB.
- European Union. (2017). *Life and the Circular Economy*. Luxembourg Publications Office of the European Union.
- Ferguson, M. E., & Souza, G. C. (2010). A Commentary on Closed Loop Supply Chains. In M. E. Ferguson, & G. C. Souza, *Closed-Loop Supply Chains. New Development to Improve the Sustainability of Business Practices* (p. 1-8). CRC Press.
- Ferguson, M., & Souza, G. (2010). *Closed-Loop Supply Chains. New Developments to Improve the Sustainability of Business Practice*. CRC Press.
- Ferguson, M., Souza, G., & Toktay, B. (2010). Examples of Existing Profitable Practices in Product Take Back and Recovery. In M. E. Ferguson, & G. C. Souza, *Closed-Loop Supply Chains. New Developments to Improve the Sustainability of Business Practices*. (p. 145-160). CRC Press.
- Fise Assoambiente, Fise Unire. (2016). *Pacchetto Circular Economy Documento di considerazioni e proposte associative*. Roma.
- Fondazione per lo Sviluppo Sostenibile. (2018). *Le modifiche alla direttiva rifiuti. Circular Economy. I principali contenuti dell'accordo a tre (Consiglio, Commissione e Parlamento) del 17/18 Dicembre 2017*.
- Gui, L., Atasu, A., Ergun, Ö., & Toktay, L. (2016). Efficient Implementation of Collective Extended Producer Responsibility Legislation. *Management Science*, 1098-1123.
- Gui, L., Atasu, A., Ergun, Ö., & Toktay, L. (2018). Design Incentives Under Collective Extended Producer Responsibility: A Network Perspective. *Management Science*, 1-22.

- Gui, L., Atasu, A., Ergun, Ö., & Toktay, L. B. (2016). Efficient Implementation of Collective Extended Producer Responsibility Legislation. *Management Science*, 62(4), 1098-1123.
- Guide, D., & Van Wassenhove, L. (2009). The Evolution of Closed-Loop Supply Chain Research. *Operations Research* 57(1):10-18.
- Guide, V. D., Souza, G. C., Van Wassenhove, L. N., & Blackburn, J. D. (2006). Time Value of Commercial Product Returns. *Management Science*, 1200-1214.
- Hardcastle, J. L. (2015, November 30). *Product Stewardship: Whose Responsibility Is It Anyway?* Tratto da Environmental Leader: <https://www.environmentalleader.com/2015/11/product-stewardship-whose-responsibility-is-it-anyway/>
- Hawks, K. (2006). *www.rlmagazine.com*. Tratto il giorno August 31, 2018 da <http://www.rlmagazine.com/edition01p12.php>
- Hickle, G. (2014). Moving beyond the “patchwork:” a review of strategies to promote consistency for extended producer responsibility policy in the U.S. *Journal of Cleaner Production*, 266-276.
- Hickle, G. T. (2013). Comparative Analysis of Extended Producer Responsibility Policy in the United States and Canada. *Journal of Industrial Ecology*, 17(2), 249-261.
- Hickle, G. T. (2014). Moving beyond the "patchwork". A review of strategies to promote consistency for extended producer responsibility policy in the U.S. *Journal of Cleaner Production*, 64, 266-276.
- Jans, H. H., & Vedder, H. H. (2012). *European Environmental Law. After Lisbon. 4th Edition*. Groningen: Europa Law Publishing.
- Kalimo, H. (2006). *E-Cycling. Linking Trade and Environmental Law in the EC an the US*. Transnational Publishers Inc.
- Kilbert, N. C. (2004). Extended Producer Responsibility: A Tool for Achieving Sustainable Development . *Florida State University Journal of Land use and Environmental Law*, 503-523.
- Kingston, S., Heyvaert, V., & Čavoški , A. (2017). *European Environmental Law*. Cambridge University Press.
- Kramer, L. (2011). *EU Environmental Law*. London: Sweet & Maxwell.

- Kumar , A. (2017). Extended TPB model to understand consumer "selling" behaviour. Implications for reverse supply chain design of mobile phones. *Asia Pacific Journal of Marketing and Logistics*, 29(1), 721-742.
- Lee, C., & Lee Lam, J. (2012). Managing reverse logistics to enhance sustainability of industrial marketing. *Industrial Marketing Management*, 589-598.
- Leonidas, M. (2018). Advancing to a Circular Economy: three essential ingredients for a comprehensive policy mix. *Sustainability Science*, 13(8), 861-878.
- Lindhout, P. E., & Van den Broek, B. (2014). The Polluter Pays Principle: Guidelines for Cost Recovery and Burden Sharing in the Case Law of the European Court of Justice. *Utrecht Law Review*, 10(2).
- Michaud, C., & Llerena, D. (2011). Green Consumer Behaviour: an Experimental Analysis of Willingness to Pay for Remanufactured Products. *Business Strategy and the Environment*, 408-420.
- Molina Martinez, J. (2018, Aprile 27). Hacia una economía circular como elemento clave para un desarrollo regional inteligente y sostenible. Zaragoza , Spagna.
- Muratori , A. (2018). La riformata direttiva quadro dei rifiuti: a beneficio dell'economia circolare, novità sui sottoprodotti e sulla perdita della qualifica di rifiuto. *Ambiente e sviluppo, (commento alla normativa)*, 8-9, 519.
- Muratori, A. (2018). Al rush finale il pacchetto di direttive per gestire i rifiuti secondo l'economia circolare. *Ambiente e Sviluppo (commento alla normativa)*, 3, 141 .
- Nash, J., & Bosso, C. (2013). Extended Producer Responsibility in the United States: Full Speed Ahead? *Journal of Industrial Ecology*, 17(2), 175-185.
- Neligan , A. (2018). *Two years later: The EU circular economy package. An update.* IW-Policy Papers, Institut der deutschen Wirtschaft (IW).
- Pokharel, S., & Mutha, A. (2009, February). Perspectives in reverse logistics: A review. *Resources, Conservation and Recycling*, 53(4), 175-182.
- Pouikli, K. (2016). The Polluter Pays Principle and the EU State Aid Law for Environmental Protection. *Journal of Law, Policy and Globalization*, 19-25.
- R. Guide, V., P. Harrison, T., & Van Wassenhove, L. (2003). The Challenge of Closed-Loop Supply Chains. *Interfaces*, 33(6), 3-6.
- Rubio, S., & Jiménez-Parra, B. (2017). Reverse Logistics: Concept, Evolution and Marketing Challenges. In A. Barbosa-Póvoa, A. Corominas, & J. de Miranda,



- Optimization and Decision Support Systems for Supply Chains* (p. 41-62). Springer.
- Russo, P. (2016). Il nuovo pacchetto sull'economia circolare. *Economia Pubblica* , 169-176.
- Sachs, N. (2006). Planning the Funeral at the Birth: Extended Producer Responsibility in the European Union and the United States. *Harvard Environmental Law Review*, 30, 51-98.
- Salassa Boix, R. (2016). The Coordinated Application of the Polluter-Pays and Ability to Pay Principles. *Revista Chilena de Derecho*, 43(3), 1005-1030.
- Schrijver, N. J. (s.d.). Chapter IV. Grounding of Sustainable Development in International Law. In *The Evolution of Sustainable Development* (p. 288-232).
- Schroeder, P. M., Anggraeni, K., & Weber, U. (2018). The Relevance of Circular Economy Practices to the Sustainable Development Goals: Circular Economy and SDGs. *Journal of Industrial Ecology* .
- Sellers, K. (2015). *Product Stewardship: Life Cycle Analysis and the Environment*. Taylor & Francis.
- Shelton, D. (2008, July). *Stockholm Declaration (1972) and Rio Declaration (1992)*. Tratto il giorno January 23, 2019 da Oxford Public International Law: <http://opil.ouplaw.com/view/10.1093/law:epil/9780199231690/law-9780199231690-e1608>
- Souza, G. (2012). *Sustainable Operations and Closed-Loop Supply Chains*. Business Expert Press.
- Stahel, W. R. (2013). Policy for material efficiency—sustainable taxation as a departure from the throwaway society. *Philos Trans R Soc Lond A: Math Phys Eng Sci* , A 371: 20110567.(<http://dx.doi.org/10.1098/rsta.2011.0567>).
- Stile , M. (2015). Da economia lineare a economia circolare: la strategia dell'Unione europea e l'anello mancante . *Rivista giuridica dell'ambiente*, 647-654.
- Stile, M. (2015). Da economia lineare ad economia circolare: un percorso in salita (From Linear Economy to Circular Economy: an Uphill Struggle). *Il Diritto comunitario e degli scambi internazionali*, 263-266.

Stindt, D., Frota Neto, J., Nuss , C., Dirr, M., Jakowczyk, M., Gibson, A., et al. (2016).  
On the Attractiveness of Product Recovery: The Forces that Shape Reverse  
Markets. *Journal of Industrial Ecology*, 980-994.

Wharton University of Pennsylvania. (2016, April 06). *Knowledge @ Wharton*. Tratto  
da [http://knowledge.wharton.upenn.edu/article/how-u-s-laws-do-and-dont-  
support-e-recycling-and-reuse/](http://knowledge.wharton.upenn.edu/article/how-u-s-laws-do-and-dont-support-e-recycling-and-reuse/)