



**PERCY**

European Strategic Cluster Partnership for PolymER reCYcling

**Deliverable D.4.1**

SWOT Analysis Synthesis

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## Introduction

The objective of WP4 is to develop a **joint internationalization strategy** for the four consortium partners, to be executed after the project has ended, and an **implementation road map**. The **primary objective** of the PERCY strategy and the goal of the consortium partners is **to ensure that European SMEs within the polymer industry access new global value chains, within recycling and eco-design, and to enable them to take a leading position globally in this field.**

The development and later implementation of the strategy will **intensify the cluster and business network collaboration** across European countries and across sectorial boundaries.

The PERCY strategy will lead to **international cluster cooperation in fields of polymers and eco-design towards third countries beyond Europe** and notably in support of the emerging industries and markets development.

**The specific objectives are to develop a joint Internationalization strategy containing:**

- The internationalization strategy plan
- The implementation roadmap

**The SWOT analysis will be performed on:**

- the individual cluster partners including their member base
- the polymer industry in selected target countries
- eventual identified sectors/ markets
- the clusters and business networks in the selected countries that were the subject of the partner mission

## Listing of SWOTs

### **Swot analysis of the plastic industry in PERCY's project partners countries**

- Swot Analysis of The Plastic Processing Industry in Denmark– Including Plast Center Danmark Analysis
- Swot Analysis of The Plastic Processing Industry in The Slovak Republic (Sr) - Including SPK Analysis
- Swot Analysis of The Plastic Processing Industry in France - Including Polymeris Analysis
- Swot Analysis of The Plastic Processing Industry in Germany- Including Kunststoffdialog Analysis
- Synthesis of the Swot Analysis of The Plastic Industry in Percy's Project Partners Countries

### **Swot analysis of the plastic Industry in PERCY's project strategic countries**

- Swot Analysis of The Plastic Industry in India - Including Cluster Analysis
- Swot Analysis of The Plastic Processing Industry in Israel
- Swot Analysis of The Plastic Industry in Canada
- Swot Analysis of The Plastic Processing Industry in United States of America
- Synthesis of the Analysis of The Plastic Industry in Strategic Countries



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# **SWOT ANALYSIS OF THE PLASTIC INDUSTRY IN PERCY'S PROJECT PARTNERS COUNTRIES**



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## SWOT ANALYSIS OF THE PLASTIC PROCESSING INDUSTRY IN DENMARK – INCLUDING PLAST CENTER DANMARK ANALYSIS

STRENGTHS	WEAKNESSES
<p><b>The Danish plastic industry in general</b></p> <ul style="list-style-type: none"> <li>- Approx. 300 companies of varying sizes – turnover in 2016 3.3 billion Euros. A very profitable business.</li> <li>- Large industry employing 1% of the entire Danish Workforce.</li> <li>- Highly export oriented – 70% of the production is exported.</li> <li>- Large and internationally oriented keyplayers such as: Novo Nordisk, Vestas Wind Systems, LEGO, Coloplast, Velux, LM Windpower, Færch Plast and SP Group. Most of them are to be found on the list of the top 100 Danish enterprises.</li> <li>- Highly automated and digitalized industry. Therefore, this industry is targeted high end products.</li> <li>- The workforce is highly educated (i.e. polymer engineers and workers with 4 years of vocational training – this vocational program has existed since 1988.</li> </ul>	<p><b>The Danish plastic industry in general</b></p> <ul style="list-style-type: none"> <li>- An industry with many SMEs who struggle to stay in business. They seem to have low margins.</li> <li>- Lack of companies with time and money to focus on innovative projects.</li> <li>- Lack of willingness to cooperate with other companies in innovative projects.</li> <li>- Reluctant to build up new business relations abroad. Many enterprises in the plastic industry see themselves as subsuppliers with no need to work abroad.</li> <li>- Relatively few people employed due to automatization and digitalization.</li> <li>- Vulnerable due to high wages in Denmark.</li> <li>- Problems with finding enough qualified employers in production and maintenance due to low unemployment rate in Denmark.</li> </ul>



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<ul style="list-style-type: none"><li>- Due to free entrance to the education system the Danish population is relatively highly educated.</li></ul>	<ul style="list-style-type: none"><li>- Limited cooperation between science and research and the private enterprises in the plastic industry.</li><li>- Difficult to attract academia to this industry, as it is situated outside the capital of Denmark.</li></ul>
<b>OPPORTUNITIES</b>	<b>THREATS</b>
<p><b>The Danish plastic industry in general</b></p> <ul style="list-style-type: none"><li>- Plastic consumption is increasing, as more metal parts are substituted with plastic parts.</li><li>- Active material development on a continued basis.</li><li>- Due to the geopolitical situation makes economically feasible to move production back to Denmark.</li><li>- Expanding global demand and consumption, especially in higher performance products.</li></ul>	<p><b>The Danish plastic industry in general</b></p> <ul style="list-style-type: none"><li>- Fluctuating raw material prices.</li><li>- Shortage of raw materials – all imported.</li><li>- Substitution of plastic with other materials.</li><li>- Ban of various single use products by 2025.</li><li>- Extended producers' responsibility.</li><li>- Overall negative attitude towards use of plastic.</li></ul>



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STRENGTHS	WEAKNESSES
<p><b>The Danish plastic industry with a focus on recycling</b></p> <ul style="list-style-type: none"><li>- The Danish plastic industry is very dedicated to recycling of plastics and many initiatives are set up to replace the use of virgin plastic with recycled plastic.</li><li>- Very innovative plastic recycling industry dealing with mechanical as well as chemical recycling.</li><li>- A number of waste handling companies – owned by municipalities - are specialized in sorting plastic waste automatically.</li><li>- The municipalities and the waste handling companies ensure that the plastic waste is processed into pellets by the plastic recyclers.</li><li>- Many new initiatives have been started due to public funding possibilities targeted plastic recycling initiatives.</li><li>- Academia is involved in funded recycling projects, and a lot of research goes on at university level. In Denmark there are 6 universities with international standards.</li><li>- The Danish government published in 2018 a specific action plan to reduce plastic waste. The Government has the vision that the consumption of plastic must be circular, and the entire value chain must be involved.</li><li>- The Danish consumers must sort their waste and valuable fractions such as plastic is treated separately.</li></ul>	<p><b>The Danish plastic industry with a focus on recycling</b></p> <ul style="list-style-type: none"><li>- Most of the companies working with recycling of plastic in Denmark are very small and have limited funds.</li><li>- Low level of internationalization.</li><li>- The enterprises in the plastic industry are unlikely to apply for public funding of projects, for which reason the work is usually done by universities and RTOs. The scope of most of the projects are therefore very academic and with limited benefit to the participating companies – especially small recyclers.</li></ul>





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<ul style="list-style-type: none"><li>- No plastic waste is sent to landfill in Denmark.</li><li>- In Denmark a very well-established arrangement for deposit on bottles. 90% of all bottles are returned and recycled.</li><li>- The Danish population of 5.8 million people is among the wealthiest in the world – no. 21 on the list. The population is therefore concerned about the environment and willing to participate in the activities related to reduction of plastic waste.</li></ul>	
<b>OPPORTUNITIES</b>	<b>THREATS</b>
<p><b>The Danish plastic industry with a focus on recycling</b></p> <ul style="list-style-type: none"><li>- Research and innovation within the field of plastic recycling is a priority of the Danish politicians.</li><li>- Politicians will impose higher taxes on incineration of plastics to encourage enterprises to recycle more plastic waste.</li><li>- Recycling of materials is on top of the political agenda.</li><li>- The public is getting more aware of the importance of recycling and the use of recyclable materials.</li><li>- The increasing cost of energy and of fossil-based fuels due to the geopolitical situation motivates enterprises to increase their emphasis on recycling of plastic – chemical as well as mechanical recycling.</li><li>- An increased willingness to pay extra for items made of recycled materials. The enterprises want a green profile.</li></ul>	<p><b>The Danish plastic industry with a focus on recycling</b></p> <ul style="list-style-type: none"><li>- Fluctuating raw material prices – if the prices of virgin materials is too low makes recycling an even more difficult business.</li><li>- Substitution of plastic with other materials.</li><li>- Increased use of biodegradable plastics as they pollute the plastic waste stream.</li><li>- Overall negative attitude towards use of plastic.</li></ul>



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<b>STRENGTHS</b>	<b>WEAKNESSES</b>
<p><b>The Danish plastic industry with a focus on the automotive industry</b></p> <ul style="list-style-type: none"><li>- There are approx. 100 Danish suppliers to the European automotive industry, and some of them are suppliers of technical plastic parts, but this is not a big segment of the Danish plastic industry.</li></ul>	<p><b>The Danish plastic industry with a focus on the automotive industry</b></p> <ul style="list-style-type: none"><li>- No automotive industry in Denmark – only subsuppliers.</li><li>- Too little effort put into becoming subsuppliers to the European automotive industry.</li></ul>
<b>OPPORTUNITIES</b>	<b>THREATS</b>
<p><b>The Danish plastic industry with a focus on the automotive industry</b></p> <ul style="list-style-type: none"><li>- Try to get more involved with the European automotive industry, as it is focused on using more polymers.</li></ul>	<p><b>The Danish plastic industry with a focus on the automotive industry</b></p> <ul style="list-style-type: none"><li>- Entrance barriers that are very high and hard to overcome.</li></ul>



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STRENGTHS	WEAKNESSES
<p><b>Danish Materials Network, DMN, facilitated by Plast Center Danmark</b></p> <p>DMN addresses the Danish plastic industry through its 90 members with special interest in polymers.</p> <ul style="list-style-type: none"><li>- Old (established in 2003) and very well-established network. Holds a database of approx. 2000 prospects.</li><li>- DMN has knowledge of polymers and recycling of polymers at expert level.</li><li>- DMN builds bridges between industry and universities through project work. During the years DMN has run more than 75 development and research projects.</li><li>- DMN makes matchmaking and networking events where the members meet. 20 – 25 events per year with 25-35 participants.</li><li>- DMN runs a number of courses every year with the aim of updating the member on specific topics. Every year 2-4 courses are offered to the member and others with interest in polymers.</li><li>- DMN is involved in internationalization projects and events. Has so far been involved in 8 international projects, where the members are offered to participate.</li><li>- Increasing experience with international projects and increasing interest from the members.</li></ul>	<p><b>Danish Materials Network, DMN, facilitated by Plast Center Danmark</b></p> <ul style="list-style-type: none"><li>- Uncertain future due to no public base funding.</li><li>- Dependant on public funded projects.</li><li>- Fewer employees than in earlier days.</li><li>- Relatively low membership fees.</li></ul>



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<ul style="list-style-type: none"> <li>- Specific focus on the European automotive industry through international events.</li> <li>- Very close connections with the members due to high level of knowledge regarding polymers and project management and administration.</li> </ul>	
<b>OPPORTUNITIES</b>	<b>THREATS</b>
<p><b>Danish Materials Network, DMN, facilitated by Plast Center Danmark</b></p> <ul style="list-style-type: none"> <li>- The 12 superclusters in Denmark were all supposed to include materials, but they do not, as they have no knowledge about this area. Many of them are therefore asking PCD/DMN for advice and assistance on issues related hereto.</li> <li>- Good funding opportunities regarding plastic recycling projects both nationally and internationally.</li> <li>- New funding possibilities to be applied for by the end of 2023.</li> <li>- New round of basic funding for networks to be applied for in 2024.</li> <li>- Network activities targeted the European automotive industry.</li> </ul>	<p><b>Danish Materials Network, DMN, facilitated by Plast Center Danmark</b></p> <ul style="list-style-type: none"> <li>- No further public funding.</li> <li>- No further public funding to be applied for.</li> <li>- No or too little interest in being a member of DMN.</li> <li>- No or too little need for the services offered by PCD.</li> <li>- Employees leaving the organization due to uncertainties.</li> </ul>



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## **SWOT ANALYSIS OF THE PLASTIC PROCESSING INDUSTRY IN THE SLOVAK REPUBLIC (SR) - INCLUDING SPK ANALYSIS**



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STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"><li>- Almost 60% of the GDP of the chemical industry in the SR is created in the area of the <b>Production of rubber and plastic products</b> (59.2%).</li><li>- According to the achieved <b>turnover</b>, the sector of production of rubber and plastic products is in 5th place in the SR, but according to the achieved economic result before taxation, it is the second most profitable sector.</li><li>- The plastics processing industry is predominantly a sector of <b>small and medium-sized companies</b>. More than 60% of the total sector is made up of SMEs.</li><li>- The largest companies that produce plastic products (they make up more than 30%) are currently included in SK NACE in the <b>motor vehicle production sector</b>. They are in the first and second line (TIER 1 and TIER 2) suppliers for the automotive industry and have exclusively foreign or multinational capital.</li><li>- More than <b>398 companies</b> with more than 25 employees are registered by <b>SPK in its database</b>. They include polymer producers, plastic processors, recycling companies, and associated industries such as fiber production, and 3D printing, but also companies for finishing operations in the plastics industry – such as painting, plating, etc.</li><li>- Since 2015, <b>sorted collection</b> in households and companies has been introduced in the Slovak Republic and in 2019, sorted collection for biodegradable waste was added.</li></ul>	<ul style="list-style-type: none"><li>- Large companies producing plastic products for the automotive sector are companies exclusively with <b>foreign capital</b>, with their own development departments and divisions, the results of which serve entire concerns but do not support cooperation with SMEs. They act as essentially <b>closed entities</b>.</li><li>- Lack of companies <b>focusing on new innovative projects</b>, waste recovery or waste reuse in Slovakia.</li><li>- Limited <b>cooperation between science, research and innovation</b> at the central state level. Cooperation is transferred to a lower level, namely between R&amp;D institutions and SMEs.</li><li>- Low <b>flexibility of R&amp;D</b>, which is paid from public funds, the lack of habit of SMEs to turn to R&amp;D institutions paid from public funds (universities) in the field of innovation. SPK is trying to influence this long-lasting state of disinterest, or mistrust between universities and companies.</li><li>- From 2015 to 2019, <b>applied research</b> recorded a significant reduction in the share of total R&amp;D, while in 2015 it accounted for 30.3% of the share of total R&amp;D, in 2019 it accounted for only 23.4%. This also applies to the plastics sector.</li><li>- In the SR, there are long-term difficulties in obtaining state subsidies or <b>grants for innovations</b>, therefore the costs of innovations are mainly paid from private and not public sources. At a certain point, this slows down the implementation of innovations.</li></ul>



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- From 2011 to 2020, the SR reduced the share of **landfilling** from 68% to 49%.

- The plastic processing sector is one of the key sectors in which **automation and robotization** already play a dominant role. Most of the companies were based from the beginning on top technologies and modern forms of work organization.

- Slovakia has a sufficient number of **universities**, several of which (mainly in technical and natural sciences) form a very good foundation for basic research as well as they are able to educate and train qualified graduates.

- Universities educating experts in the plastics processing industry, also being interested in cooperation with SMEs, are also very well technically equipped. In numbers, 5 key faculties from 3 universities in Slovakia are members of SPK.

- **The Slovak Academy of Sciences** is the concentration of research and development of the Slovak Republic and is starting to get closer to the problems of practice through its institute – **The Institute of Polymers** with a large share in patents and other outputs protected by the intellectual property). The Institute of Polymers is also a member of the SPK.

- **SPK** was created "from the bottom" (based on companies' needs and interests), 13 years ago, in order to solve the problem of training professional staff at the secondary school level. In 13 years, SPK became a partner representing primarily SMEs at the level of central state administration bodies.

- Creation of a low **number of jobs in the field of plastic processing industry** with a higher added value. That is one of the reasons why qualified graduates leave for work abroad.

- Lack of **qualified employees** in the plastic processing industry – in production, but also maintenance - who would be able to ensure new or innovated production programs.

- Qualified and available **workforce** is needed **for the operation of R&D centres** – such as high-quality graduates of technical universities, able to think critically and innovatively. Many young people go to study abroad, where they have better job opportunities after graduation.

- Low **promotion of innovative products** from the plastic industry, recycled products or products from new materials. There is no tool for joint promotion of innovative or recycled products.

- Very low real **support for applied research** in the SR. It is rather non-systemic, and information for SMEs is scarcely available.

- **Low willingness to use existing public resources** for research (corruption, lengthy and biased program management from organizations providing EU funds).

- Bottle **backup system not fully functioning** - the network for collecting PET and cans was not fully developed. So far, only 3 companies are customers, and the return volume is high (in PET recycling there is no 1:1 ratio, meaning that from one old = one new product. Recycled material is added to a maximum of 30% in the new manufactured bottle).



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- In 2021, SPK has achieved the **ESCA Silver Label** Cluster Certification.
- SPK is a **member of the Sectoral Council for Chemistry and Pharmacy**, which is the state's advisory body for the given sector. There SPK represents SMEs in the field of plastic processing, recycling companies, and entities in cooperating areas. SPK enforced 5 National Employment Standards for plastics processing, which serve to ensure formal, informal, and informal education.
- In 2020, on the basis of the SPK initiative and with the cooperation of Secondary vocational schools and member companies, the foundations of **3 new teaching and study fields** were laid. Within the V4 countries (CZ, PL, HU, SR), SR is the **only country with professional fields of study for the plastics industry**, which also includes the area of circular economy and is set to be **cross-sectoral** (cross-sectoral study fields: chemistry, mechanical engineering, electrical engineering, and environment) Currently, 5 Secondary vocational schools have the opportunity to teach new fields in SR.
- The **biodegradable and fully compostable material “NONOILEN”**, which is protected by a patent, has been developed in the Slovak Republic. SPK has been helping since 2012 in applied research and testing of this material using various technologies. At the same time, the company producing NONOILEN is a member of SPK. SPK members who tested NONOILEN have skills and experience beyond other companies.





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OPPORTUNITIES	THREATS
<p>- Among medium and large companies, approximately 11% of companies have exclusively <b>Slovak capital</b>. Medium-sized companies with Slovak capital are set to develop innovations, both in the plastic processing industry and in recycling and reuse of already consumed products in a different form. SPK regularly monitors these companies.</p> <p>- In the SR, there is a <b>wide range of support tools for R&amp;D support</b> (<i>including also a weakness: it is non-systematic and often on a very small scale, and at the same time this information is not easily available for SMEs</i>).</p> <p>- A very <b>strong network of accredited laboratories and testing facilities</b> that also provide services to neighboring countries. In most cases, they are a good basis for applied research.</p> <p>- A <b>strategic document</b> has been adopted in the SR – “<b>Waste Management Program of the Slovak Republic</b>” for the years 2021 to 2025. This means a shift from material recovery to waste prevention. In this context, the Waste program focuses primarily on reuse, support for waste sorting at the source and recycling, better use of bioplastics, and also the introduction of the obligation to sort textile waste.</p> <p>- At the beginning of June 2022, a <b>document</b> was adopted - "<b>Overview of policy recommendations to stimulate circularity in production - Preparation of a circular economy roadmap and concept</b>". Therefore, the circular economy is firmly embedded in strategic documents for the years 2023-2030 at the state level but also in all regions (document supported by OECD experts).</p>	<p>- Manufacturers of plastic products are primarily suppliers to the <b>automotive industry</b> (4 car factories in a 250 km radius). The production of packaging, which is predominant in Europe from the point of view of EU statistics, accounts for less than 30% of the production of plastic products in the SR – low <b>diversification of production</b>.</p> <p>- Low <b>support for innovation in plastic companies</b> - public resources for applied research are decreasing every year; SMEs are not in good shape in the area of innovation compared to other EU countries. There is a threat that the ideas of Slovak companies will be supported by <b>foreign capital</b> and Slovak companies may lose autonomy (<i>in some cases they might "sell intellectual property outputs to someone who will help these outputs get into practice"</i>).</p> <p>- <b>Innovation management</b> from the state's point of view is “<b>three-track</b>” - which is very dangerous. <b>Science and research</b> is supported by the Ministry of Education, Science, Research and Sport of the Slovak Republic; <b>innovations</b> are under the auspices of the Ministry of Economy of the SR and <b>R&amp;D management at the regional level</b> is under the auspices of the Ministry of Investments, Regional Development and Informatization of the SR. Science, research and innovation are still coordinated by the Office of the Government of the SR. In addition, the first two ministries created their own budget and contribution organizations to provide direct aid for science and research. The system created in this way is <b>unclear and non-cooperative</b> and results in not drawing public resources and not supporting good ideas.</p>



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- Slovakia signed up for the **backup system for PET bottles and cans** on January 1, 2022, and since then it is **in practice**. (Amendment of the Waste Act)
- **Waste Act** from 2015 - **sorting of waste, biodegradable waste** from 2019, an amendment to the law is being prepared from January 2024 - sorting of **textile waste**.
- **SPK is part of the working group at the level of the Ministry** and relevant institutions involved in the collection, separation, and recycling of textile waste. In this role, SPK provides support for **intersectoral cooperation**.
- A document is in place favoring **Green public procurement** at the level of the public and state sectors.
- Solving the situation from weaknesses: lack of **qualified employees** in the plastic processing industry - SPK is involved in process of preparing a **tool for sharing experts**.
- Solving the situation from weaknesses: lack of qualified and available **workforce for the operation of R&D centers** – **SPK connecting university students directly with interesting companies** while still studying.
- Solving the situation from weaknesses: Low **promotion of innovative products** from the plastic industry - SPK **publishes an Innovation brochure**, updated every year, and the number of companies being presented within it is growing with every new edition. This brochure is brought with SPK representatives to every mission or meeting realized abroad.

- The Slovak **economy has a dual character**. The main economical part is formed by branches of multinational companies (MNCs), especially the 4 major car companies and consumer electronics manufacturers, which also brought dozens of their own suppliers (large and medium-sized companies) with them. There is still a risk that MNCs branches may leave Slovakia with their suppliers and move to cheaper countries. (*What happened with SONY, SAMSUNG*)
- **Low related variety of key branches** of the Slovak economy, such as engineering, consumer electronics, production of metals and metal products, production of plastic products, as well as the development of information and communication technologies.
- Low and delayed withdrawal of **financial resources from EU** funds for the support of innovations. At the end of 2018, more than 50% of the allocated budget for challenges until 2020 had not been contracted. This creates assumptions that the budget for the Slovak Republic will continue to decrease.
- **Missing state strategy** in the area of R&D and cluster policy.
- **Fragmentation and duplication of R&D** support institutions.
- Unnecessarily high **administrative burden** of obtaining R&D support and bureaucracy of public and state administration.
- **Unclear attitude of the government** towards the energy recovery of plastics.



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	<p>- State <b>propaganda negatively focuses on all plastic products</b> (mainly led by environmental organizations that do not give another alternative) instead of educational solutions for handling waste plastics or leading the population to reduce the use of plastics, extend the life of plastics, etc.</p>
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**Additional comments:**

- The predominant technology in plastic processing is the **injection** and in recycling, it is **material recycling** (chemical recycling done by only one company and energy recovery by only 2 companies)
- **The inclusion of manufacturers of plastic products in NACE** creates a problem in tracking statistical data and analysis. They are classified in various sectors, while the largest companies are tracked in the sector "Production of motor vehicles".
- Rules for waste recovery facilities, especially for composting plants, are part of the **existing legislation and the Waste Act** (from 2015). The introduction of a quality label for high-quality compost is also expected.
- **A very well-developed network of composting facilities** throughout the Slovak Republic. There were programs for municipalities and cities that financially supported the construction of composting facilities from EU funds.



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## SWOT ANALYSIS OF THE PLASTIC PROCESSING INDUSTRY IN FRANCE - INCLUDING POLYMERIS ANALYSIS

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> <li>- <b>Polymeris cluster</b></li> <li>- An interregional cluster with national dimension and European ambition, with more than 500 members</li> <li>- An ambitious strategy focused on Industry for the future and Sustainable development, including the polymer recycling with numerous members involved or interested</li> <li>- Has established a strong relationship between academic research and industry</li> <li>- A lot of european project engaged</li> <li>- <b>The French plastic industry</b></li> <li>- The French plastics market weighs more than 65 billion € with nearly 5000 companies, 48% of which are VSEs and 36% SMEs<sup>1</sup></li> <li>- France is the 3rd European producer of packaging with a turnover of 18,3 billions €, 38% of which concerns plastic packaging</li> </ul>	<ul style="list-style-type: none"> <li>- <b>Polymeris cluster</b></li> <li>- An economical model relatively weak</li> <li>- Members are mostly SMEs</li> <li>- <b>The French plastic industry</b></li> <li>- An aging workforce, the plastics sector is struggling to recruit</li> <li>- They are not sufficiently informed about all the calls of the projects and the funding support put in place by the French government</li> <li>- SMEs and VSEs do not naturally call on the clusters to help them with their specific needs</li> <li>- Many of the SMEs do not have the human and financial resources to carry out R&amp;D projects</li> <li>- Some of the SEMs do not have the 'culture' of collaborative project and often prefer to carry out their development projects internally</li> </ul>

<sup>1</sup> [polyvia.economie-la-plasturgie-en-france](http://polyvia.economie-la-plasturgie-en-france)



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<ul style="list-style-type: none"> <li>- Many national programs have been set up by the French government to support the industrials in their innovation and circular economy strategy, for example: ORPLAST program launched since 2016, aims to support the plastic industrials in the incorporation of the recycled plastic in their process production, which has led to many collaborative projects between the actors of plastic value chain</li> <li>- In addition to the regulations that will become increasingly restrictive, the awareness of French consumers of the climate crisis pushes the plastic industrials to propose more recycled packaging solution</li> </ul>	
<p><b>- OPPORTUNITIES</b></p>	<p><b>- THREATS</b></p>
<ul style="list-style-type: none"> <li>- implication of the French government in the financing of competitiveness clusters for the next few years (2023 – 2026)</li> <li>- The regulation requires the incorporation of recycled raw material in the manufacture of plastic products</li> <li>- The European directive 2018/852 imposes the recycling of the 50% of plastic waste packaging by 2025 and 55% by 2030.</li> <li>- Many regional and national calls for projects stimulating collaborative work between universities and industrials in order to propose new recycling technologies and more efficient sorting.</li> </ul>	<ul style="list-style-type: none"> <li>- The surge in raw material prices combined with those of energy put industrials in a difficult state, some of them plan to reduce or even stop their production in the months to come<sup>2</sup>.</li> <li>- 70% of the rubber produced is intended for the automotive market, with the massive introduction of the electric vehicles, the French rubber industrials will be widely impacted</li> <li>- The plastics and rubbers industrials are struggling to cope with the fast evolution of the regulations</li> </ul>

<sup>2</sup> protéger certains plasturgistes envisagent de cesser l'activité



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<ul style="list-style-type: none"><li>- Structuring of the recycling sector, with the emergence of the new actors in the recycling and the valorization of the pre- and post-consumer plastic waste.</li></ul>	<ul style="list-style-type: none"><li>- Plastic's industrials come up against difficulties with the use of the recycled plastic as raw material in their process: the uncertain recycled plastic quality in terms of chemical substances, deposits still not enough to satisfy all the demand, its price which is often more expensive than that of the virgin raw material.</li><li>- The multimaterial solution is often chosen to substitute plastic</li></ul>
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## SWOT ANALYSIS OF THE PLASTIC PROCESSING INDUSTRY IN GERMANY- INCLUDING KUNSTSTOFFDIALOG ANALYSIS

<b>STRENGTHS</b>	<b>WEAKNESSES</b>
<ul style="list-style-type: none"><li>- A regional cluster with 80 members</li><li>-19 years of experience, more than 50 projects</li><li>-Engaged in three European and numerous regional projects</li></ul>	<ul style="list-style-type: none"><li>- General recycling companies are the dominating players in all parts of the recycling markets (heavily) investing in pyrolizers</li><li>- Margins of polymer companies acting as suppliers for the automotive industry are relatively weak</li><li>- Members are mostly SMEs</li></ul>
<b>OPPORTUNITIES</b>	<b>THREATS</b>
<ul style="list-style-type: none"><li>- Research and Innovation are a priority of the European, German and regional policies</li><li>- Circular economy is a priority of both the government of the Federal State of Baden-Württemberg and Germany</li><li>- Recycling materials and especially polymers are a priority</li><li>- Recycling is an alternative to the substitution of plastics by other materials</li><li>- Merger at hand with other regional clusters in the fields of the automotive and metal working industries</li></ul>	<ul style="list-style-type: none"><li>- Polymer sector and industry regularly accused of having a negative impact on environment</li><li>- Member companies in the business of plastics and rubber recycling are being acquired by general recycling companies</li><li>- Crude oil-based polymers may (partly) be substituted by biopolymers (and then recycling may no longer be a top priority)</li></ul>



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## SWOT ANALYSIS OF THE PLASTIC INDUSTRY IN PERCY'S PROJECT PARTNERS COUNTRIES

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"><li>- Each partner cluster has an expert level knowledge of polymers and recycling of polymers.</li><li>- Close connections with the members due to high level of knowledge regarding polymers, project management and administration.</li><li>- Each partner cluster is involved in many European and international projects increasing experience and interest from the members to participate. Also, clusters build bridges between industry and universities through project collaborations and promote innovation.</li><li>- Strong plastic and rubber industry presence in each partner country.</li><li>- Automation and robotization play a dominant role in the rubber and plastic industry.</li><li>- The rubber and plastic industry is targeted high end products because of the top technologies and modern forms of work organization.</li><li>- The workforce is highly trained and educated.</li><li>- The plastic industry is very dedicated to recycling of plastics and many initiatives are set up to replace the use of virgin plastic with recycled plastic.</li></ul>	<ul style="list-style-type: none"><li>- An industry with many SMEs who struggle to stay in business. They seem to have low margins.</li><li>- Plastic and rubber industrials are struggling to cope with the fast evolution of regulation in terms of chemical substances, requirements for waste reduction and recyclability</li><li>- SMEs often lack time and funding support to develop new innovative projects</li><li>- Lack of willingness to cooperate with other companies in innovative projects.</li><li>- Reluctant to build up new business relations abroad. Many enterprises in the plastic industry see themselves as subsuppliers with no need to work abroad.</li><li>- Limited cooperation between science and research and the private enterprises in the plastic industry.</li><li>- The enterprises in the plastic industry are unlikely to apply for public funding of projects, for which reason the work is usually done by universities and RTOs.</li></ul>





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<ul style="list-style-type: none"> <li>- Very innovative plastic recycling industry dealing with mechanical as well as chemical recycling.</li> <li>- Many new initiatives have been started due to public funding possibilities targeted plastic recycling initiatives.</li> <li>- Academia is involved in funded recycling projects, and a lot of research goes on at university level.</li> </ul>	<ul style="list-style-type: none"> <li>- Many barriers still to be overcome in order to use more recycled plastic as raw material: (price and quality)</li> <li>- Some polymers still technically difficult to recycle</li> <li>- The management of plastic waste has not yet been standardized</li> <li>- Dependence on public funded projects.</li> </ul>
<b>OPPORTUNITIES</b>	<b>THREATS</b>
<ul style="list-style-type: none"> <li>- In each partner country, research and innovation within the field of plastic recycling is a priority in national and regional policies.</li> <li>- Great recycling market potential, in all partner countries recycling network are being set-up</li> <li>- All partner countries are moving towards a landfill ban of recyclable plastic waste</li> <li>- The increasing cost of energy and of fossil-based fuels motivates the governments involved to increase their emphasis on recycling of plastic.</li> <li>- Good funding opportunities regarding plastic recycling projects both nationally and internationally.</li> <li>- Society's awareness, especially in Europe, of the environmental impact of the plastic waste.</li> </ul>	<ul style="list-style-type: none"> <li>- Polymer sector and industry regularly accused of having a negative impact on environment. Overall negative attitude towards use of plastic.</li> <li>- Substitution of plastic with other materials.</li> <li>- Shortage of raw material due to the geopolitical framework</li> <li>- The multimaterial solution is often chosen to substitute plastic</li> <li>- Uncertainty of the implication of the national governments for the next few years.</li> <li>- Low financial resources from EU funds.</li> </ul>



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- An increased willingness to pay extra for items made of recycled material, using recycled material can be a selling point for plastic's industrials
- The industrials in plastic sector tend to adopt more circular economy model
- Recycling is an alternative to the substitution of plastics by other materials.
- Cross-Industry cooperation.
- New funding possibilities to be applied (2023 /2024)



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# **SWOT ANALYSIS OF THE PLASTIC INDUSTRY IN PERCY'S PROJECT STRATEGIC COUNTRIES**



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## SWOT ANALYSIS OF THE PLASTIC INDUSTRY IN INDIA - INCLUDING CLUSTER ANALYSIS

STRENGTHS	WEAKNESSES
<p><b>The Indian plastic industry in general</b></p> <ul style="list-style-type: none"> <li>- A fast growing market with a growth rate twice as high as the rest of the Indian economy, where the main segments are automotive, packaging and electronics.</li> <li>- Widespread usage of plastic products.</li> <li>- Approx. 30,000 companies of varying sizes – total value in 2020 36.07 Bn Euros. A very profitable business.</li> <li>- Large industry employing 4 mill people - less than 1 % of the entire Indian workforce of 467 Mn.</li> <li>- Highly export oriented – one of the world’s largest exporters of plastic products. Plastic goods are exported to 150 countries mainly to Europe, Africa and Asia.</li> <li>- Large and internationally oriented keyplayers such as: Reliance Industries, Tipco Industries Ltd., Rajiv Plastics Ltd., Milacron India Pvt. Ltd., Borouge (India) Pvt Ltd., Haldia Petrochemicals, Milacron India Pvt. Ltd., LG Polymers India, Ineos Styrolution, Bhramaputra Cracker &amp; Polymer Ltd, and DCM Shriram.</li> <li>- Established plastic parks - industrial zones devoted to plastic enterprises and its allies industries. It includes a whole range of companies required by the plastics processing community from material and machinery suppliers,</li> </ul>	<p><b>The Indian plastic industry in general</b></p> <ul style="list-style-type: none"> <li>- An industry dominated by small/medium scale enterprises. They hold nearly 85% of the market.</li> <li>- Vulnerable due to labour shortage.</li> <li>- Vulnerable due to poorly educated workforce. 11% of the population has a degree at graduate level or above. 70% of Indians with an engineering-degree are not industrial employable! Every one in four persons is not literate.</li> <li>- Low productivity.</li> <li>- Lack of raw materials, as Indian raw material producers export their goods rather than supplying the domestic market.  Therefore, heavily dependent on imported raw materials.</li> <li>- There is a nationwide power deficit and adequate power supply is needed.</li> <li>- Still a lot of old and obsolete equipment. However, the situation is improving.</li> <li>- Lack of companies with time and money to focus on new innovative projects.</li> </ul>



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<p>plastics processing companies, plastic recycling companies including waste management system.</p> <ul style="list-style-type: none"><li>- Foreign investment is allowed.</li><li>- Lower wages compared with Europe.</li><li>- Young population and therefore young workforce.</li></ul>	<ul style="list-style-type: none"><li>- Lack of willingness to cooperate with other companies in innovative projects.</li><li>- Reluctant to build up new business relations abroad. Many enterprises in the plastic industry see themselves as subsuppliers with no need to work abroad.</li><li>- Many formalities to overcome in relation to exports.</li><li>- Limited cooperation between science and research and the private enterprises in the plastic industry, and the policymakers.</li></ul> <p>There should be a collective effort made by universities, research organizations, plastic manufacturers, and, most importantly, policymakers. They should collaborate and come up with ideas for renewable energy integration and process optimisation.</p> <ul style="list-style-type: none"><li>- The enterprises in the plastic industry are unlikely to apply for public funding of projects, for which reason the work is usually done by universities and RTOs. The scope of most of the projects are therefore very academic and with limited benefit to the participating companies.</li><li>- India is not a startup-friendly nation The Indian government does not focus on raising top-notch technical talent and global business skills through “reverse brain-drain.” However, initial efforts are made.</li></ul>
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<b>OPPORTUNITIES</b>	<b>THREATS</b>
<p><b>The Indian plastic industry in general</b></p> <ul style="list-style-type: none"><li>- Increase of investments through national capital participation and by attracting foreign companies to set up new companies in the country, or to cooperate with existing companies.</li><li>- Increase in domestic market demand for plastic products.</li></ul>	<p><b>The Indian plastic industry in general</b></p> <ul style="list-style-type: none"><li>- Increasing prices on crude oil and indirectly on raw materials.</li><li>- Gradual disappearance of the reduced labour cost advantage.</li><li>- Insufficient foreign investments.</li></ul>

<b>STRENGTHS</b>	<b>WEAKNESSES</b>
<p><b>The Indian plastic industry with a focus on recycling</b></p> <ul style="list-style-type: none"><li>- Regarding recycling the Indian plastic industry is relatively immature. However, many initiatives are set up to increase the rate of recycled plastics among the 5,000 registered recyclers in India.</li><li>- The India Plastics Pact (IPP) has been signed under a collaboration between the World Wildlife fund, and the Confederation of Indian Industries. The IPP aims at a circular economy for plastics with innovative ways to eliminate, reuse or recycle the plastic packaging across the plastics value chain.</li><li>- Many new initiatives have been started in spite of no or limited public funding possibilities targeted plastic recycling initiatives.</li></ul>	<p><b>The Indian plastic industry with a focus recycling</b></p> <ul style="list-style-type: none"><li>- Lack of focus on recycling of plastic due to too low margins.</li><li>- Lack of sufficient amounts of good quality raw materials.</li><li>- Inconsistent collection and sorting.</li><li>- Plastic recycling in India is very informal, where ragpickers sort out the waste and sell it to dealers. There are about 1,000 unregistered recycling units in India.</li></ul>



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<ul style="list-style-type: none"> <li>- Academia is involved in funded recycling projects, and research goes on at university level.</li> </ul>	<ul style="list-style-type: none"> <li>- Some irregularities happen when government land is allocated for public recycling infrastructures. Only the largest investors are heard and not the informal sector with the good ideas.</li> <li>- 40% of all plastic waste in India is sent to landfill.</li> <li>- Rules and regulations must be more industrial friendly.</li> <li>- Lack of coordination between authorities. Inconsistent policies and inconsistent implementation.</li> </ul>
<b>OPPORTUNITIES</b>	<b>THREATS</b>
<p><b>The Indian plastic industry with a focus on recycling</b></p> <ul style="list-style-type: none"> <li>- Research and innovation within the field of plastic recycling is a priority of the Indian politicians.</li> <li>- The public is getting more aware of the importance of recycling and the use of recyclable materials.</li> <li>- The increasing cost of energy and of fossil-based fuels due to the geopolitical situation motivate enterprises to increase emphasis on recycling of plastic – chemical as well as mechanical recycling.</li> <li>- An increased willingness to pay extra for items made of recycled materials. The enterprises want a green profile.</li> <li>- Extended Producer Responsibility on packaging was introduced in 2021 and gives many opportunities regarding development of new ideas.</li> </ul>	<p><b>The Indian plastic industry with a focus on recycling</b></p> <ul style="list-style-type: none"> <li>- Substitution of plastic with other materials.</li> <li>- Ban of various single use products by 2025.</li> <li>- Overall negative perception towards use of plastic.</li> </ul>



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<b>STRENGTHS</b>	<b>WEAKNESSES</b>
<p><b>The Indian plastic industry with a focus on the automotive industry</b></p> <ul style="list-style-type: none"><li>- The automobile industry is a huge driving force behind the growth of the Indian plastic industry.</li><li>- India is the second fastest growing consumer market for automotives in the world (after China).</li><li>- The automotive market in India is fast growing with reported annual growth rates of 10 – 11% during the last five years.</li></ul>	<p><b>The Indian plastic industry with a focus on the automotive industry</b></p> <ul style="list-style-type: none"><li>- Increased competition from South Korea and China.</li><li>- Volatility in the fuel prices a very determining factor for growth of this sector.</li><li>- Macroeconomic uncertainty.</li></ul>
<b>OPPORTUNITIES</b>	<b>THREATS</b>
<p><b>The Indian plastic industry with a focus on the automotive industry</b></p> <ul style="list-style-type: none"><li>- Increase in income level allowing for buying more new cars.</li><li>- Increasing demand of cars in rural areas.</li><li>- Increasing demand for two-wheelers in rural areas.</li><li>- Viewed as a global hub for small cars.</li><li>- National Automotive Testing and R&amp;D Infrastructure Projects (NATRIP), a US\$ 400million initiative, aims to create the state-of-art dedicated testing, validation and R&amp;D infrastructure across the country.</li><li>- Entering new markets in other parts of the world.</li></ul>	<p><b>The Indian plastic industry with a focus on the automotive industry</b></p> <ul style="list-style-type: none"><li>- Low labour productivity</li><li>- High interests and high over heads make the production uncompetitive.</li><li>- Inadequate and low investment in R&amp;D.</li><li>- Supply chain infrastructural bottlenecks.</li><li>- Multiple tax components in the cost of the vehicle.</li><li>- Lack of economies of scale.</li></ul>





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STRENGTHS	WEAKNESSES
<p><b>All India Plastics Manufacturers' Association, AIPMA</b></p> <ul style="list-style-type: none"> <li>- The AIPMA is one of the largest and oldest Apex Bodies of the Plastic Industry in India.</li> <li>- Ensures involvement of stakeholders (relevant ministries, intermediaries, RTOs, clusters etc.) in development and implementation of strategies and funding programs.</li> </ul> <p>AIPMA promotes plastics in compliance with the National and International Standards and Certifications in this regard.</p> <p>AIPMA is recognized by the Chemical &amp; Fertilizers Ministry, Department of Petrochemicals, Government of India and has representation at various ministries to voice concerns and difficulties faced by the industry.</p> <p>AIPMA is the preferred organizer of national as well as international seminars, lectures, training programs and liaison between the government and the industry.</p> <p>The organization acts as nodal agents to promote global plastics exhibitions &amp; trade delegations.</p> <ul style="list-style-type: none"> <li>- Triple-helix cooperation through systems. The triple helix model of innovation refers to a set of interactions between academia (the university), industry and government, to foster economic and social development.</li> </ul>	<p><b>All India Plastics Manufacturers' Association, AIPMA</b></p> <ul style="list-style-type: none"> <li>- Due to the size no detailed knowledge about its members.</li> <li>- Difficult to mobilize small companies to participate.</li> <li>- Lack of awareness in SMEs around the services of AIPMA.</li> <li>- Applying for funding is too complicated and time consuming stealing time and awareness of the members.</li> <li>- Uncertain future due to no public base funding.</li> <li>- Dependant on public funded projects.</li> <li>- Fewer employees than in earlier days.</li> <li>- Relatively low membership fees.</li> </ul>



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<ul style="list-style-type: none"> <li>- Holds a strong position in the innovation system. Ensures bottoms up approaches, driven by demand of the industry. In good cooperation with regional government, regional strategies are developed with input from business leaders.</li> <li>- Increasing experience with international projects and increasing interest from the members.</li> <li>- Specific focus on the automotive industry through international events.</li> </ul>	
<b>OPPORTUNITIES</b>	<b>THREATS</b>
<p><b>All India Plastics Manufacturers' Association, AIPMA</b></p> <ul style="list-style-type: none"> <li>- Good funding opportunities regarding plastic recycling projects both nationally and internationally.</li> <li>- Growing weight of clusters in policymaking and knowledge funneling.</li> <li>- New funding possibilities to be applied for by the end of 2023.</li> <li>- New round of basic funding for networks to be applied for in 2024.</li> <li>- Network activities targeted the European plastic industry.</li> </ul>	<p><b>All India Plastics Manufacturers' Association, AIPMA</b></p> <ul style="list-style-type: none"> <li>- Reduction of structural funds.</li> <li>- No further public funding to be applied for.</li> <li>- No or too little interest in being a member of AIPMA.</li> <li>- No or too little need for the services offered by AIPMA.</li> <li>- Employees leaving the organization due to uncertainties.</li> </ul>



The above SWOT-analyses are the written outcome of meetings with:

Mr. Kishore P. Sampat, President, AIPMA, Mr. Deepak Ballani, Director General, AIPMA, Mr. Manoj Barve, CEO, Kontakt India, Mr. Daniel Raja, Exec. Direktor, BVMV, Dr. Sameer Joshi, CEO, Knoesis Enterprises and Co-chariman of Plastindia 2023, Mr. Joseph Kurian, Innovation Center Denmark, and desk-research work done by Ms. Dorte Walzl Bælum, CEO, Plast Center Danmark.

The analyses will serve as input to the final reporting to the European Community of the project: International Cluster Cooperation for Recycling of Polymers, Project Number: 951200.



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## SWOT ANALYSIS OF THE PLASTIC PROCESSING INDUSTRY IN ISRAEL

<b>STRENGTHS</b>	<b>WEAKNESSES</b>
<ul style="list-style-type: none"><li>- Established location of the solid waste management center</li><li>- Regular waste collection (Five waste separation bins are presented to the public)</li><li>- Strong information and training programs to promote waste management</li><li>- Legislative action, the so-called “Plastic bag law” introduced in 2017</li><li>- In 2018, the Ministry of Environmental Protection created a national plan for streamlining resources and a circular economy in industry</li><li>- Israel is renowned for its remarkable ecological achievements and is recognized as a hub for eco-innovation.</li><li>- Various innovative post-plastic usage innovations (e.g. UBQ converts household waste into sustainable bio-based materials that can serve as feedstock for new products, or Plastic2Nrg converts plastics into electricity through a unique oxidation methodology)</li><li>- National interventions: Israel’s Clean Beach Program &amp; Clean Coast Index; Municipal Solid Waste Management; Plastic Bag Law.</li></ul>	<ul style="list-style-type: none"><li>- Israel’s rising production and consumption of single-use plastics indicate a lack of eco-design</li><li>- Israelis are among the highest consumers of plastic in the world – this could be an opportunity for a more eco-design approach in combination with waste taxation</li><li>- Inadequate waste management infrastructure</li><li>- Inefficient sorting of food waste</li><li>- Shortcomings in the composting process</li><li>- The incentive provided for recycling single-use plastics is low. To buy new plastics remains cheaper than investing in recycling infrastructure. The incentive to recycle SUPs is even lower for individual consumers who don’t see the direct benefits of recycling.</li><li>- Lack of stronger government intervention (such as the “bag law”) is required to achieve set goals in terms of a circular plastic economy.</li><li>- Majority of Israel’s plastic waste is transported overseas.</li></ul>



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<b>- OPPORTUNITIES</b>	<b>- THREATS</b>
<ul style="list-style-type: none"><li>- Application of new technologies</li><li>- Waste taxation – motivate the public to make less waste or use the money for innovation in the area</li><li>- Israel’s recent waste management action plans include plans to develop a large-scale waste-to-energy facility. Energy recovery is an alternative method to retain the value of plastics in the economy – thus turning the weakness of sending waste abroad into the creation of new industries and jobs.</li><li>- Increasing demand for more sustainable alternatives has led many plastic producers to turn to bioplastics. Also, there is growing investment in this new industry (But the biopolymer industry is still in the research and development stage and will take time to fully evolve).</li><li>- Creating a circular economy is becoming a central issue in sustainable development strategies at the national, regional, and national levels. The circular economy framework has been widely accepted as an opportunity to simultaneously benefit society, the economy, and the environment. This is largely driven by the Ministry of Environmental Protection, with additional contributions from the Ministry of Economy &amp; Industry in Israel.</li><li>- Israel has planned to recycle 50% of its total waste by 2050</li><li>- Recycling policy including an incentive to recycle single-use plastics provides a framework/tool for public behaviour change</li></ul>	<ul style="list-style-type: none"><li>- Insufficient attention to promoting environmental research</li><li>- Invalidity of composting standardization with the inability to recycle biowaste efficiently poses threat to waste management actions as it is a significant source of waste that can be effectively used for the circular economy.</li><li>- Latent development of recycling environment – inefficient and consumptive nature of Israel’s current plastic economy</li><li>- Necessity of Consumer Engagement – sustainability-oriented approaches – lack of political will to force stricter laws incentivizing the public for more sustainable thinking</li><li>- Incentivizing Habit Changes – shifting consumer behavior through social and financial means.</li><li>- Financial Incentives – efforts to improve recycling rates have largely consisted of financial mechanisms.</li><li>- Public distrust as a barrier – poor self-efficacy that drives public inaction and deters sustainable behaviour. Lack of trust leads to a belief that individual behaviours cannot influence the situation (effect of self-legitimization).</li></ul>



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## SWOT ANALYSIS OF THE PLASTIC INDUSTRY IN CANADA

STRENGTHS	WEAKNESSES
<p>Canada is the 6th largest producer of plastics in the world. Strong plastic and rubber industry</p> <p>The annual growth rate, since 2000, has been growing steadily and, despite a certain dip in 2008 and the threat of Asian competitors, the outlook is still favorable with significant growth.</p> <p>The plastics and composites industry is composed mainly of small and medium-sized companies, which is an undeniable advantage since SMEs are able to react to changes in the environment more quickly than large companies</p> <p>70% of companies use up to 79% recycled plastics.</p> <p>Government of Canada actions:</p> <ul style="list-style-type: none"> <li>○ The Canadian Plastics Science Program</li> <li>○ Canadian Plastics Innovation Challenge</li> <li>○ Microbeads in Toiletries Regulations</li> <li>○ Plastics in the Oceans Charter</li> <li>○ Zero Plastic Waste Strategy and Canada-wide Action Plan (Phase 1 and Phase 2)</li> </ul> <p>Advanced materials in Quebec:</p> <ul style="list-style-type: none"> <li>○ More than 450 companies conducting internal R&amp;D activities and collaborating with external partners</li> <li>○ More than 45,000 jobs</li> </ul>	<p>Recruitment and retention of the workforce.</p> <p>30% of the employees are women and they are mostly active in administrative positions. The main obstacle to their integration is the physical nature of the work. An industry with many SMEs who struggle to stay in business. They seem to have low margins.</p> <p>Many barriers still to be overcome in order to use more recycled plastic as raw material: (price and quality)</p> <p>Some polymers still technically difficult to recycle</p>



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<ul style="list-style-type: none"> <li>○ Engine of innovation and growth for Quebec.</li> <li>○ Quebec is home to 28% of Canada's plastics and composites companies, second only to Ontario's 46%.</li> </ul> <p>Important R&amp;D community:</p> <ul style="list-style-type: none"> <li>○ Groups of academic and industrial researchers</li> <li>○ Numerous networks</li> <li>○ State-of-the-art equipment platforms</li> </ul> <p>The plastic industry is very dedicated to recycling of plastics and many initiatives are set up to replace the use of virgin plastic with recycled plastics.</p>	
<b>OPPORTUNITIES</b>	<b>THREATS</b>
<ul style="list-style-type: none"> <li>- Quebec shares a long border with the United States, which is one of the largest markets in the world for the manufacture of machinery, tools and resins as well as for the consumption of plastic products. In a context of globalization, such proximity gives Quebec producers an unparalleled advantage in the world, due to comparative transportation and commercial costs.</li> <li>- The industry can count on numerous teaching and research institutions with specializations in the field of polymers as well as high-caliber training programs at the high school, college and university levels adapted to the needs.</li> <li>- The trend towards sustainable development, which allows for a reduction in environmental impact that can be translated into sound waste management</li> <li>- Acceleration of the digital shift</li> <li>- Implementing initiatives in line with the principles of sustainable development and the circular economy</li> <li>- Recruiting an immigrant labor pool in response to worker shortage issues.</li> </ul>	<ul style="list-style-type: none"> <li>- COVID-19 has brought several negative impacts to the industry, including weakened employee mental health that is expected to be felt for some years to come.</li> <li>- The polymer sector and industry is regularly accused of having a negative impact on the environment. General negative attitude towards the use of plastics.</li> <li>- Replacement of plastic with other materials.</li> <li>- Multi-material solution is often chosen to replace plastic.</li> <li>- Polymer sector and industry regularly accused of having a negative impact on environment. Overall negative attitude towards use of plastic.</li> <li>- Substitution of plastic with other materials.</li> </ul>



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- An increased willingness to pay extra for items made of recycled material, using recycled material can be a selling point for plastic's industrials
- The industrials in plastic sector tend to adopt more circular economy model
- Recycling is an alternative to the substitution of plastics by other materials.

- The multi material solution is often chosen to substitute plastic





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## SWOT ANALYSIS OF THE PLASTIC PROCESSING INDUSTRY IN UNITED STATES OF AMERICA

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> <li>- Plastics industry in the USA is broad-based and stable. Stable production figures. The biggest exporter of resin in 2019 was the U.S.</li> <li>- One of the technologically most advanced countries, strong research and development on a national level</li> <li>- Attracts researchers and high skilled employees worldwide strengthening the manufacturing of products in their own country (back to the US “buy American”)</li> </ul>	<ul style="list-style-type: none"> <li>- The U.S. was the world’s top plastics and rubber producer in 2005. By 2020, Chinese plastics and rubber production was 2.5 times that of the U.S.</li> <li>- Strong dependence on exports</li> <li>- Regarding recycling, weak awareness for recycling topics/ sustainability</li> <li>- Geographically massive and therefore very diverse, also natural disasters like earthquakes</li> </ul>
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> <li>- Challenges create new business models and new companies</li> <li>- China, the U.S., and Germany top three players in the global plastics trade in 2020 (similarities)</li> <li>- Strengthening the cooperation in the industry itself and utilize the expertise of all plastics industry companies.</li> </ul>	<ul style="list-style-type: none"> <li>- General negative developments such as recession, shortage of raw materials</li> <li>- “America first” strategy</li> <li>- Trade wars e.g. with China</li> <li>- Shortage of skilled workers</li> <li>- Increasing regulations in terms of requirements for recycling, waste reduction and prevention, design for disassembly etc.</li> <li>- Bans on certain types of polymer materials and consumer demand for alternatives</li> <li>- Different laws in different countries makes it difficult to enter global markets</li> </ul>



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## SWOT ANALYSIS OF THE POLYMER INDUSTRY CLUSTER (GAC OHIO)

<b>STRENGTHS</b>	<b>WEAKNESSES</b>
<ul style="list-style-type: none"> <li>- Globally recognized universities in polymers and advanced materials research</li> <li>- Strong industry presence and plastic manufacturing base</li> <li>- Strong bio-derived, nature inspired, liquid crystal research community</li> <li>- Low customer class concentration</li> <li>- Low product and service concentration</li> <li>- Strong supporting and service infrastructure</li> <li>- High revenue per employee – efficiency innovation</li> </ul>	<ul style="list-style-type: none"> <li>- Limited venture funding</li> <li>- Lack of entrepreneurial ecosystem</li> <li>- Skilled workforce pipeline</li> <li>- High capital requirements</li> <li>- High competition, medium imports, high volatility</li> <li>- High product &amp; service concentration</li> <li>- High customer class concentration</li> <li>- Lack of data analytics, AI, VR, Machine Learning talent and initiative</li> <li>- Weak local and global collaboration</li> </ul>
<b>OPPORTUNITIES</b>	<b>THREATS</b>
<ul style="list-style-type: none"> <li>- Potential for strong integration and collaboration between universities and industry – education, research &amp; innovation</li> <li>- Lead the world in sustainability – materials and product lifecycle management, Green Polymer Valley</li> <li>- High revenue growth</li> <li>- High performance drivers</li> <li>- Trade-weighted index</li> <li>- High skilled/ wages jobs</li> </ul>	<ul style="list-style-type: none"> <li>- Polymer Centers elsewhere in Ohio (eg Ohio state), Columbus and other states e.g. Research Triangle Park</li> <li>- Loss of polymer science talent to other regions and states</li> <li>- Low revenue growth</li> <li>- Low performance drivers</li> <li>- Local major companies venture spending out of state</li> <li>- Automotive production moving to south and western states</li> <li>- Industrial production index</li> </ul>



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## SWOT ANALYSIS OF THE RECYCLING IN UNITED STATES OF AMERICA

<b>STRENGTHS</b>	<b>WEAKNESSES</b>
<ul style="list-style-type: none"><li>- One of the technologically most advanced countries, strong research and development on a national level</li><li>- High-consumption and high-spending residents in general</li></ul>	<ul style="list-style-type: none"><li>- Very low recycling rate</li><li>- Separation of waste not standardized and common</li><li>- No standardized legal situation concerning recycling</li><li>- Awareness of the need for recycling not established in the population</li><li>- Single-Stream-Recycling</li></ul>
<b>OPPORTUNITIES</b>	<b>THREATS</b>
<ul style="list-style-type: none"><li>- Great market potential, as the sector is only in its beginnings</li><li>- Great opportunities for European companies to sell machines for recycling applications</li><li>- Strengthening the manufacturing of products in their own country (back to the US “buy American”)</li><li>- Due to the size of the US market, enormous growth potential of the recycling sector</li><li>- Cross-industry cooperation in the plastics sector possible</li></ul>	<ul style="list-style-type: none"><li>- Increasing regulations in terms of requirements for recyclability, waste reduction and prevention, design for disassembly etc.</li><li>- Bans on certain types of polymer materials and consumer demand for alternatives</li><li>- General negative developments such as recession, shortage of raw materials</li><li>- Shortage of skilled workers</li></ul>



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## SWOT ANALYSIS SYNTHESIS OF THE PLASTIC INDUSTRY IN STRATEGIC TARGET COUNTRIES

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"><li>-Academia is involved in funded recycling projects, and research goes on at university level.</li><li>-The plastic industry is very dedicated to recycling of plastics and many initiatives are set up to replace the use of virgin plastic with recycled plastics.</li><li>-Strong industry presence and plastic manufacturing base</li><li>-The public is getting more aware of the importance of recycling and the use of recyclable materials.</li><li>-The increasing cost of energy and of fossil-based fuels due to the geopolitical situation motivate enterprises to increase emphasis on recycling of plastic – chemical as well as mechanical recycling</li><li>-Increasing experience with international projects and increasing interest from the members.</li><li>-Triple-helix cooperation through systems. The triple helix model of innovation refers to a set of interactions between academia (the university), industry and government, to foster economic and social development.</li><li>- Ensures involvement of stakeholders (relevant ministries, intermediaries, RTOs, clusters etc.) in development and implementation of strategies and funding programs.</li></ul>	<ul style="list-style-type: none"><li>-Very low recycling rate</li><li>-Separation of waste not standardized and common</li><li>-No standardized legal situation concerning recycling Awareness of the need for recycling not established in the population</li><li>-Many barriers still to be overcome in order to use more recycled plastic as raw material: (price and quality)</li><li>-High capital requirements</li><li>-Some polymers still technically difficult to recycle</li></ul>



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OPPORTUNITIES	THREATS
<ul style="list-style-type: none"><li>- The trend towards sustainable development, which allows for a reduction in environmental impact that can be translated into sound waste management.</li><li>-Growing weight of clusters in policymaking and knowledge funnelling.</li><li>-Network activities targeted the European plastic industry. Great opportunities for European companies to sell machines for recycling applications</li><li>- Acceleration of the digital shift</li><li>- Implementing initiatives in line with the principles of sustainable development and the circular economy</li><li>-Cross-industry cooperation in the plastics sector possible</li><li>- An increased willingness to pay extra for items made of recycled material, using recycled material can be a selling point for plastic's industrials.</li><li>- The industrials in plastic sector tend to adopt more circular economy model</li><li>- Recycling is an alternative to the substitution of plastics by other materials.</li></ul>	<ul style="list-style-type: none"><li>- The polymer sector and industry is regularly accused of having a negative impact on the environment. General negative attitude towards the use of plastics.</li><li>- Replacement of plastic with other materials.</li><li>-Multi-material solution is often chosen to replace plastic.</li><li>-Polymer sector and industry regularly accused of having a negative impact on environment. Overall negative attitude towards use of plastic.</li><li>- Substitution of plastic with other materials.</li><li>-The multimaterial solution is often chosen to substitute plastic</li><li>-Increasing regulations in terms of requirements for recyclability, waste reduction and prevention, design for disassembly etc.</li><li>-General negative developments such as recession, shortage of raw materials</li><li>-Shortage of skilled workers</li></ul>



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## SWOT ANALYSIS : EU AUTOMOTIVE MARKET & RECYCLING

STRENGTHS	WEAKNESSES
<p>-OEM strong skills and tier one suppliers in EU, especially in France and Germany: Bosch, Continental, Valeo, Faurecia-Hella, Michelin, etc.</p> <p>- Major automotive stakeholders' will to include eco-design and circular economy:</p> <ul style="list-style-type: none"> <li>- Stellantis group undertook having 30% green materials (recycled or biobased) on its vehicles</li> <li>- Michelin: BlackCycle project (designing world-first processes to produce new tyres from end-of-life tyres), partnership with Enviro (first new-generation recycling plant built in Chile), partnership with Canadian company Pyrowave to industrialize an innovative plastic waste recycling technology</li> <li>- Audi works with Karlsruhe Institute for Technology for chemical recycling pilot project</li> </ul> <p>- Polymer materials (plastics, composites) replacing steel or glass allows to lower vehicle weight</p> <p>- Existing recycling and material recovery technologies, new technologies also in development</p> <p>- Less and less diversity in materials used : reduction in materials (less specialty rubber linked to heat engine technical specifications, simplified interior design of electric vehicles such as Tesla or Volkswagen ID)</p>	<p>- All materials are still not intrinsically recyclable (composites and crosslinked elastomers, battery chemistry) or are not recyclable because they contain hazardous or polluted substances (for example, a 20 years vehicle contains substances that may be polluted or forbidden by REACH regulation)</p> <p>-OEM still not enough willing to simplify some specifications</p> <p>-Multimaterials solutions too often chosen</p> <p>-No technological solution to recycle some of the new major components such as batteries or some substances (flame retardants)</p> <p>- Few reuse for parts of end-of-life vehicles; industrials not organized for retrofit solutions and replacement</p> <p>- No obligation or few obligations to recycle some wearing parts apart from tyres (example: no obligation to recycle wiper blades and filters, few obligations to recycle bumpers)</p> <p>- Energy recovery sometimes still preferred (not enough will from automotive and material stakeholders)</p>



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OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> <li>- New public regulations imposing a higher and higher rate of recycled materials</li> <li>- Integration of recycled materials can be an argument for sales</li> <li>- Circular economy; REACH, sustainable development</li> <li>- Design for recycling, recyclability, etc.</li> <li>- Imperative need to lower vehicle weight (electrification, autonomous car)</li> <li>- Electric vehicle and hydrogen: 100% of non-heat engine vehicles from 2035/2040 (new heat engine vehicles will be banned from sales in Europe and North America)</li> <li>- Raw materials and fossil energy tensions: higher costs are giving an advantage to recycled materials</li> <li>- Shortening and securing the supply chain</li> <li>- Refurbishing strategy of car manufacturers (example: Renault Refactory, Flins (France))</li> </ul>	<ul style="list-style-type: none"> <li>- Imperative compliance with REACH regulation</li> <li>- Instability of automotive market: vehicle of the future (use vs possession), energy to use, slow fleet renewal</li> <li>- Extending vehicle life (more than 10 years in developed countries)</li> <li>- End of life of electric vehicles and batteries: lifecycle of some products is still unknown</li> <li>- Electric vehicles and batteries produced in China but ending their life in Europe: how to integrate those materials in China for recycling?</li> <li>- No taxes or very few taxes on using virgin raw materials, no green tax on new vehicles or tyres, etc.</li> </ul>

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