

PR.1

Evaluate potential markets

Simple activity

This activity provides a structured approach to identifying suitable markets to target with your eco-innovation services.



INPUTS

- List of the main industrial sectors and markets that SMEs in your country are involved in.
- Basic information about the characteristics of the main industry sectors, markets and companies operate in your country.

OUTPUTS

- A well-defined market or set of markets that you will target with your eco-innovation services.
- Preliminary list of relevant companies in your target market, used in the activities *PR.4 Identify sustainability hotspots across the value chain* and *PR.8 Plan and implement engagement activities*.

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There are three levels of granularity that should be considered when looking for new markets to target: the sector level, the market level, and the company level.

At the sector level, some of the key considerations for choosing a sector to target are the contribution of the sector to environmental sustainability problems at a global level (such as climate change, pollution, resource consumption, water use), the direct social sustainability impacts of the sector (on issues such as gender equality, job creation and worker welfare), and the amount of attention the sector receives from NGOs regarding sustainability issues in the sector.

At the market level, some of the key considerations are:

- Supporting policy and finance - If your country has a National Development Plan or a Sustainable Consumption and Production Strategy, this can provide a good source of information about national priority sectors and long term sustainability targets. Focusing on these priority sectors can make it easier to gain support and funding from government organizations.
- Credibility and channel - Which sectors and markets do you currently work with? Do you have existing contacts (senior management at relevant companies) in a sector or market that could support you? Or would you be starting from scratch?
- Growth and profitability – Markets where growth, margins and profitability are good are more likely to have funds available to invest in eco-innovation and your consulting services.

Finally, at the company level, some of the key considerations are:

- Commercial success – Companies that are profitable and growing strongly make better targets for eco-innovation services as they are more likely to have a good senior management team in place and have the financial resources available for investment in eco-innovation implementation.
- Innovation track record - Companies that have a good track record of innovation in terms of their products, operations and business model are more likely to be able to cope with the demands of eco-innovation, which requires innovation in many areas of the company.
- Existing sustainability performance – Companies that have already publicly shown their commitment to improving their sustainability performance and have experienced the benefits of pursuing sustainability activities (such as Cleaner Production and environmental management) are more likely to be successful at eco-innovation.

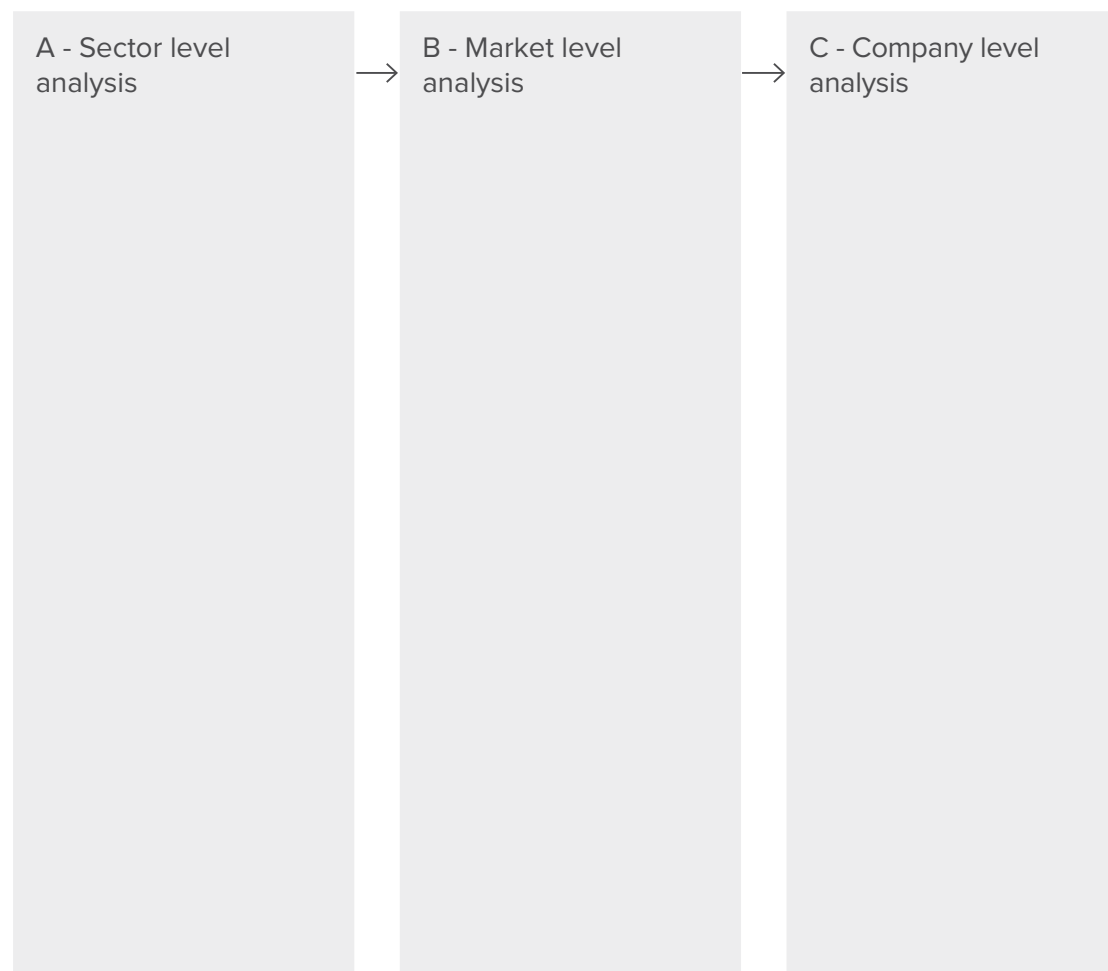
It is important to complete this process of analysing sectors, markets and types of company in a thorough and comprehensive manner. Rushing this process can result in a poor choice of target market, which in turn will lead to significant time and effort being wasted on companies that are not really committed to/suitable for eco-innovation.

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HOW TO GO ABOUT IT

1. Begin by creating a list of the main industrial sectors and markets that SMEs in your country are involved in.
2. Answer the questions in Section A (Sector-level analysis) and add up the score out of 10 points for each of the sectors in your list.
3. Decide which sectors to focus on by comparing the scores from Section A. Filter out low-scoring sectors and select two or three of the highest scoring sectors to take forward to the next step.
4. Answer the questions in Section B (Market-level analysis) and add up the score for the market out of 20 points for each of the markets within your chosen sectors.
5. Decide which markets to focus on by comparing the scores from Section B. Filter out low-scoring markets and select two or three of the highest scoring markets to target.
6. Within each of your selected markets try to identify some relevant companies.
7. Answer the questions in Section C (Company-level analysis) and add up the score out of 10 points. You should target the highest scoring companies when you begin to engage companies later in the process.

Template of Target Identification



Target identification

Project

Date

Version

A - Sector-level analysis

Sector name:

Score:

A1 – To what extent does the sector contribute to global greenhouse gas emissions and climate change (taking into account the full lifecycle of the product or service delivered by the sector)?

- Major contributor e.g. agriculture, chemicals, automotive, energy etc. 2 points
- Moderate contributor e.g. insurance, banking, software etc. 1 points
- Contribution is negligible 0 points

A2 - To what extent does the sector contribute to global consumption of non-renewable resources and potable water (taking into account the full lifecycle of the product or service delivered by the sector)?

- Major contributor e.g. agriculture, chemicals, automotive, energy etc. 2 points
- Minor contributor e.g. Insurance, banking, software etc. 1 points
- Contribution is negligible 0 points

A3. To what extent does the sector contribute to global pollution problems (taking into account the full lifecycle of the product or service delivered by the sector)?

N.B. A 2012 report defined the 10 worst global pollution problems as follows:

10 worst global pollution problems in 2012

(Blacksmith Institute & UNIDO, 2012)

Lead-Acid Battery Recycling	Industrial Estates
Lead Smelting	Artisanal Gold Mining
Mining and Ore Processing	Product Manufacturing
Tannery Operations	Chemical Manufacturing
Industrial/Municipal Dump Sites	Dye Industry

- Major contributor e.g. see list above. 2 points
- Moderate contributor e.g. insurance, banking, software etc. 1 points
- Contribution is negligible. 0 points

A4. How important is the sector for the national economy?

- High importance, contributes over 15% of GDP or employs over 15% of workforce 2 points
- Medium importance, contributes over 5% of GDP or employs over 5% of workforce 1 points
- Low importance, contributes less than 5% of GDP and employs less than 5% of workforce 0 points

A5. To what extent has this sector been targeted by Non-Governmental Organizations (NGOs) to encourage improvements in sustainability performance?

- Major focus of sustained, global campaigns by NGOs. 2 points
- Focus of occasional, local campaigns by NGOs. 1 points
- No focus/attention from NGOs. 0 points

B - Market-level analysis**Description of the market:****Score:**

N.B. Questions B1-B6 assess the likely demand for eco-innovation services in the market. Questions B7-B10 assess the probability that your organization could successfully provide this service.

B1. How strong is the growth of this market?

- Strong (>5% per year) 2 points
- Moderate (2-5% per year) 1 points
- Weak (<2% per year) 0 points

B2. How strong is the competition in this market?

- Strong (6+ companies competing) 2 points
- Moderate (2-5 companies competing) 1 points
- Monopoly (1 company) 0 points

B3. To what extent is government policy encouraging and supporting moves towards improved sustainability performance?

- Major support from policy, including financial measures. 2 points
- Moderate support from policy, but no financial measures. 1 points
- No support from policy. 0 points

B4. Is this market affected by new or forthcoming legislation?

- Major changes required to meet new or forthcoming legislative requirements 2 points
- Moderate changes required to meet new or forthcoming legislative requirements 1 points
- No new or forthcoming legislation. 0 points

List the relevant legislation that you have identified in the space below: Fisheries Ministry currently considering imposing fishing quotas on tuna.

B5. How interested are the end customers of this market in improved sustainability performance?

- Major interest – willing to switch products/suppliers or pay a price premium for better sustainability performance. 2 points
- Moderate interest – information about sustainability performance is considered as part of the purchase decision, but not a deciding factor. 1 points
- No interest. 0 points

B6. Are there trends that would encourage eco-innovation in this market? Relevant trends might include: new energy efficient technologies being developed; companies marketing products based on sustainability characteristics; a workforce that is motivated to support progress on sustainability issues etc.

- Yes, several strong trends that would encourage eco-innovation. 2 points
- Possibly, one or two weak trends that would encourage eco-innovation. 1 points
- No relevant trends. 0 points

List the trends that you have identified for this market in the space below:

B7. Do you have existing customers, reputation and credibility in this market?

- Yes, significant number of existing customers and well known in this market. 2 points
- Yes, some existing customers but not well known in this market. 1 points
- No customers or reputation in this market. 0 points

B8. Are the potential companies in this market similar to the types of organization that we normally choose to work with? Would they make good companies for our organization?

- Yes, exactly the type of company that we aim to work with. 2 points
- Possibly, some similarities but some differences. 1 points
- No, not the type of company that we aim to work with. 0 points

B9. Do we have the necessary sector and market knowledge within our organisation today to deliver eco-innovation services to this market?

- Yes, we have several staff with relevant sector and market knowledge 2 points
- Possibly, we have one member of staff with some relevant sector and market knowledge. 1 points
- No relevant sector or market knowledge. 0 points

B10. How easy would it be to collaborate with other organisations within this market based on geographic location?

- Relatively easy – majority of market, including final customer, is within the same country 2 points
- Somewhat difficult – significant proportion of market or final customer is in a different country 1 points
- Very difficult – majority of market, including final customer, is in a different country 0 points

C - Company-level analysis

Name of the company:

Score:

C1. To what extent is sustainability an explicit and public part of the core strategy and values of the company?

- Major focus on sustainability – public statements or literature explicitly stating that sustainability is a core part of the company strategy and values. 2 points
- Moderate focus on sustainability – sustainability not mentioned in company strategy or values but some evidence of interest in sustainability performance. 1 points
- No existing focus on sustainability. 0 points

C2. To what extent is sustainability performance of the company's products and services part of their product marketing and positioning?

- Major focus on sustainability – sustainability performance a major and consistent feature of the marketing and branding of the products and services of the company. 2 points
- Moderate focus on sustainability – a minor and occasional feature of the marketing and branding of the products and services of the company. 1 points
- No existing focus on sustainability in marketing and positioning. 0 points

C3. What experience and capability does the company have in innovation?

- Significant experience and capability – frequent, successful innovations with evidence of significant resources dedicated to innovation, such as the existence of an R&D team. 2 points
- Moderate experience and capability – some notable innovations, but no resources dedicated to supporting innovation. 1 points
- No experience or existing capability in innovation. 0 points

C4. What experience and capability does the company have in managing environmental issues?

- Significant experience and capability – formal environmental management system in operation and resources dedicated to supporting environmental improvement 2 points
- Moderate experience and capability – some environmental management initiatives in operation but no resources dedicated to environmental improvement. 1 points
- No experience or existing capability in managing environmental issues. 0 points

C5. What is the position of the company in their market?

- Market leader. 2 points
- Not the market leader. 0 points

Notes

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LEARNING CASE STUDY OF TARGET IDENTIFICATION

A - Sector-level analysis

Sector name: Food processing

Score: 9/10

A1 – To what extent does the sector contribute to global greenhouse gas emissions and climate change (taking into account the full lifecycle of the product or service delivered by the sector)?

- Major contributor e.g. agriculture, chemicals, automotive, energy etc. [2 points]
- Moderate contributor e.g. Insurance, banking, software etc. [1 point]
- Contribution is negligible. [0 points]

A2 - To what extent does the sector contribute to global consumption of non-renewable resources and potable water (taking into account the full lifecycle of the product or service delivered by the sector)?

- Major contributor e.g. agriculture, chemicals, automotive, energy etc. [2 points]
- Minor contributor e.g. Insurance, banking, software etc. [1 point]
- Contribution is negligible. [0 points]

A3. To what extent does the sector contribute to global pollution problems (taking into account the full lifecycle of the product or service delivered by the sector)?

N.B. A 2012 report defined the 10 worst global pollution problems as follows:

10 worst global pollution problems in 2012

(Blacksmith Institute & UNIDO, 2012)

Lead-Acid Battery Recycling	Industrial Estates
Lead Smelting	Artisanal Gold Mining
Mining and Ore Processing	Product Manufacturing
Tannery Operations	Chemical Manufacturing
Industrial/Municipal Dump Sites	Dye Industry

- Major contributor e.g. see list above. [2 points]
- Moderate contributor e.g. Insurance, banking, software etc. [1 point]
- Contribution is negligible. [0 points]

A4. How important is the sector for the national economy?

- High importance, contributes over 15% of GDP or employs over 15% of workforce [2 points]
- Medium importance, contributes over 5% of GDP or employs over 5% of workforce [1 point]
- Low importance, contributes less than 5% of GDP and employs less than 5% of workforce [0 points]

A5. To what extent has this sector been targeted by Non-Governmental Organizations (NGOs) to encourage improvements in sustainability performance?

- Major focus of sustained, global campaigns by NGOs. [2 points]
- Focus of occasional, local campaigns by NGOs. [1 point]
- No focus/attention from NGOs. [0 points]

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B - Markets-level analysis

Description of the market: Canned tuna producers selling to domestic and international markets.

Score: 16/20

N.B. Questions B1-B6 assess the likely demand for eco-innovation services in the market. Questions B7-B10 assess the probability that your organization could successfully provide this service.

B1. How strong is the growth of this market?

- Strong (>5% per year) [2 points]
- Moderate (2-5% per year) [1 point]
- Weak (<2% per year) [0 points]

B2. How strong is the competition in this market?

- Strong (6+ companies competing) [2 points]
- Moderate (2-5 companies competing) [1 point]
- Monopoly (1 company) [0 points]

B3. To what extent is government policy encouraging and supporting moves towards improved sustainability performance?

- Major support from policy, including financial measures. [2 points]
- Moderate support from policy, but no financial measures. [1 point]
- No support from policy. [0 points]

B4. Is this market affected by new or forthcoming legislation?

- Major changes required to meet new or forthcoming legislative requirements [2 points]
- Moderate changes required to meet new or forthcoming legislative requirements [1 point]
- No new or forthcoming legislation. [0 points]

List the relevant legislation that you have identified in the space below: Fisheries Ministry currently considering imposing fishing quotas on tuna.

B5. How interested are the end customers of this market in improved sustainability performance?

- Major interest – willing to switch products/suppliers or pay a price premium for better sustainability performance. [2 points]
- Moderate interest – information about sustainability performance is considered as part of the purchase decision, but not a deciding factor. [1 point]
- No interest. [0 points]

B6. Are there trends that would encourage eco-innovation in this market?

Relevant trends might include: new energy efficient technologies being developed; companies marketing products based on sustainability characteristics; a workforce that is motivated to support progress on sustainability issues etc.

- Yes, several strong trends that would encourage eco-innovation. [2 points]
- Possibly, one or two weak trends that would encourage eco-innovation. [1 point]
- No relevant trends. [0 points]

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List the trends that you have identified for this market in the space below: Development of more sustainable Fish Aggregation Devices (FADs) that help to avoid by-catch. Concerns from international NGOs about overfishing.

B7. Do you have existing customers, reputation and credibility in this market?

- Yes, significant number of existing customers and well known in this market. **[2 points]**
- Yes, some existing customers but not well known in this market. [1 point]
- No customers or reputation in this market. [0 points]

B8. Are the potential companys in this market similar to the types of organization that we normally choose to work with? Would they make good companys for our organization?

- Yes, exactly the type of company that we aim to work with. **[2 points]**
- Possibly, some similarities but some differences. [1 point]
- No, not the type of company that we aim to work with. [0 points]

B9. Do we have the necessary sector and market knowledge within our organisation today to deliver eco-innovation services to this market?

- Yes, we have several staff with relevant sector and market knowledge **[2 points]**
- Possibly, we have one member of staff with some relevant sector and market knowledge. [1 point]
- No relevant sector or market knowledge. [0 points]

B10. How easy would it be to collaborate with other organisations within this

market based on geographic location?

- Relatively easy – majority of market, including final customer, is within the same country [2 points]
- Somewhat difficult – significant proportion of market or final customer is in a different country **[1 point]**
- Very difficult – majority of market, including final customer, is in a different country [0 points]

C - Company-level analysis

Name of the company: Tuna Processing Company

Score: 6/10

C1. To what extent is sustainability an explicit and public part of the core strategy and values of the company?

- Major focus on sustainability – public statements or literature explicitly stating that sustainability is a core part of the company strategy and values. [2 points]
- Moderate focus on sustainability – sustainability not mentioned in company strategy or values but some evidence of interest in sustainability performance. **[1 point]**
- No existing focus on sustainability. [0 points]

C2. To what extent is sustainability performance of the company's products and

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services part of their product marketing and positioning?

- Major focus on sustainability – sustainability performance a major and consistent feature of the marketing and branding of the products and services of the company. [2 points]
- Moderate focus on sustainability – a minor and occasional feature of the marketing and branding of the products and services of the company. [1 point]
- No existing focus on sustainability in marketing and positioning. [0 points].

C3. What experience and capability does the company have in innovation?

- Significant experience and capability – frequent, successful innovations with evidence of significant resources dedicated to innovation, such as the existence of an R&D team. [2 points]
- Moderate experience and capability – some notable innovations, but no resources dedicated to supporting innovation. [1 point]
- No experience or existing capability in innovation. [0 points]

C4. What experience and capability does the company have in managing environmental issues?

- Significant experience and capability – formal environmental management system in operation and resources dedicated to supporting environmental improvement [2 points]
- Moderate experience and capability – some environmental management initiatives in operation but no resources dedicated to environmental improvement. [1 point]

- No experience or existing capability in managing environmental issues. [0 points]

C5. What is the position of the company in their market?

- Market leader. [2 points]
- Not the market leader. [0 points]

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TIPS & TRICKS

DESK RESEARCH ACTIVITY

Note that this activity should be completed as desk research - it is not necessary to contact any of the potential clients at this stage

ADD YOUR OWN CRITERIA

Remember that the selection criteria proposed in the *Target Identification template* are generally relevant but that you should add your own selection criteria based on your understanding of the companies in your country and the business strategy of your own organisation. You should also revisit the criteria and choice of target markets if you find that your initial choices are not successful.

KEEP A RECORD

You should keep a record of potential customers that you have identified and researched, whether or not you decide they are a good prospect. Keeping a record of this information and making sure the rest of your team have access to it will avoid duplication of work and will make communication with customers more effective and efficient. The information you gather about potential customers should be managed through some kind of Customer relationship management (CRM) system, which might be a simple spreadsheet that is easily accessed and updated by other members of your team, or could be one of the many dedicated software solutions.

BACKGROUND INFORMATION

It is worth noting at this point that it is assumed throughout the manual that the company's are Small and Medium-sized Enterprises (SMEs). Depending on the definition adopted, an SME can include companies ranging from 'start-ups' with one or two employees, 'micro enterprises' with fewer than 10 employees, 'small enterprises' with fewer than 49 employees, all the way through to well-established medium-sized companies employing up to 249 people (European Commission, 2003). This manual does not specifically focus on the particular needs of start-ups and micro enterprises, but the methodology described is applicable to these types of company with a little extra thought. Table 1 highlights some of the attributes of a company that are important for eco-innovation and describes how they are likely to vary from a start-up or micro enterprise to a small or medium enterprise. Of course every company is unique and will deviate to some extent from these typical models, but they should provide a useful starting point to guide your thinking.

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Table 1: Attributes of an organisation important for eco-innovation and the type of company.

Attribute	Relevance for eco-innovation	Start-up	Micro enterprise	Small or Medium enterprise
Strategic inertia (resistance to change in strategy and business model)	High strategic inertia will require more effort to initiate and implement changes in strategy and business model.	Low – Still learning about markets, competitors. May not yet have decided on strategy and business model.	Low-moderate – Likely to have strategy and business model which they can articulate but low level of maturity.	Moderate-high – Well-established strategy and business model which may be difficult to change.
Operational inertia (resistance to change in operations)	If the company has made large investments in production equipment or has well established ways of working it will be harder to make changes in these areas.	Low – unlikely to have made significant capital investments in production equipment or personnel and still working out best ways of working.	Low-moderate – Likely to have established particular ways of working but may not yet have made large capital investments in production equipment.	Moderate-high – Likely to have significant capital investments in current technology, personnel etc.
Attitude to risk and risk management	Eco-innovation, like any innovation activity, will involve some risk. The company must be willing to take calculated risks and capable of managing those risks.	Willing to take risks – Entrepreneurs are typically willing to take risks but lack of resources and systems for formal risk analysis and management can result in failure.	Moderately risk averse – Having survived the start-up phase, micro enterprises will probably have experienced some tough periods and so begin to become more risk aware and sensitive to risk taking.	Increasingly risk averse – Typically, companies become more risk averse as they grow larger. However, well established companies will tend to have better systems in place for managing risk.
Innovation resources	The greater the quantity of financial, technical and human resources available for innovation the easier it will be to initiate eco-innovation activities.	Limited – very few staff and narrow range of expertise, very limited financial resources.	Limited-moderate – Few staff and narrow range of expertise but may have better access to finance if the company has a stable financial track record.	Moderate – Larger number of staff may include wider range of expertise and more likely to be able to access additional financial resources from investors of government schemes.
Decision making style	Senior management within the company will be required to make important decisions at every step of the eco-innovation process.	Rapid and responsive – Everything is decided by company founders so decisions are made quickly.	Efficient – Without multiple layers of management, decisions can still be taken efficiently but may require more time for consideration than in a start-up.	Becoming bureaucratic – May have formalized decision-making procedures and bodies such as a Board of Directors. Such procedures will tend to slow down the decision-making process.

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References and resources

Industry classification and definition of SME:

- United Nations International Standard Industrial Classification of all Economic Activities (ISIC) rev.4. Available from: http://unstats.un.org/unsd/publication/seriesM/seriesm_4rev4e.pdf
- European Commission Recommendation 2003/361/EC concerning the definition of micro, small and medium-sized enterprises. Available from: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:124:0036:0041:en:PDF>

Sources of market analysis data:

- International Trade Centre (ITC). General data on international trade. Available from: <http://www.intracen.org/>
- CBI (Centre for the Promotion of Imports from developing countries). Data on EU markets and trading with partners within the EU. Available from: http://www.cbi.eu/marketintel_platform
- Food and Agriculture Organization of the United Nations. Data on global food prices and sustainability threats being faced by the agri-food sector. Available from: <http://www.fao.org/home/en/>
- COLEACP. Information on sustainable horticulture. Available from: <http://www.coleacp.org/en>

→ Further information in the Agri-food, Chemicals and Metals Supplements

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TIPS & TRICKS

ADDITIONAL CONSIDERATIONS FOR AGRI-FOOD MARKETS

You can filter your list of high-economic value, agri-food markets further by considering the following questions:

- What are the most relevant market trends? (e.g. convenience products, healthy foods or fresh food distribution)
- Do relevant national or regional policies and roadmaps exist that promote or hinder some activities? (e.g. support to export a given product, stricter compliance criteria for export)
- Which voluntary initiatives apply to the chosen market?
- Do legal regulations exist that influence

your business (e.g. restrictions on the use of palm oil or trans fat)?

- What unmet needs can you identify from market trends (e.g. calorific or nutrient value in current products)?
- Which end markets are most attractive from a value proposition perspective?
- Which agri-food companies serve the end market, and where are they located in the value chain?
- Which steps in the value chain create the most value?

Based on this, you can start thinking about:

- What key capabilities can agri-food companies offer in these markets to achieve a competitive advantage?

How can these key capabilities be translated into a new business strategy and business model?

LOOK FOR MARKETS WITH HIGH ECONOMIC VALUE

You may start by identifying the agri-food markets that have higher economic value in your region (e.g. bakery, meat products, fruits & vegetables and fish) and analyse the value chains of these sectors from raw material production to how the final products are sold to and consumed by the consumer or end-user. This will help to identify the main players in the value chain (e.g. farmers, food industry and retailers) and the markets with potential for eco-innovation.

USE OF BENCHMARKS TO IDENTIFY AGRI-FOOD MARKETS WITH HIGH POTENTIAL FOR IMPROVEMENT

Benchmarking is a technique used to assess performance against either internal or industry standards. Operational or technological improvement measures first applied at one site may be applicable at others, even in different food and drink processing markets. These techniques may be considered in addition to comparing numerical consumption and emission levels. Typically, benchmarks are expressed as ratios, but can also be expressed as percentages, e.g. efficiency. More information on benchmarking provided in activity BM.3 Gather additional data on operational performance.

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IDENTIFY INNOVATIVE MARKETS

The implementation of eco-innovation might be more successful in a market that is more open to innovation in general. For instance, the meat industry in many countries is considered conservative and very reluctant to any changes. By comparison, the dairy industry has seen a lot of innovation, especially regarding new product development. Within a given industry the level of innovation will also vary depending on the local context. In order to identify innovative markets you can:

- Use your personal experience – as a consumer of food products, what trends have you noticed on the food shelves at your local market? From

which industry do you see new innovative products? Is there a particular industry that has increased focus on sustainability?

- Conduct desk research – search for companies/products that are being recognized as innovative in your region. What markets do these companies serve?
- Interview key people from the industry – this might give you a good insight into how innovative companies are in different markets. Try to understand why they are innovating. Is it to meet consumer demands, legislative pressures, or some other reason?

LEARNING CASE STUDY

At this stage you have selected to focus on the food and drink processing sector from the list of key industrial sectors in the country that were identified by completing Section A in the *Target Identification* template. After conducting additional market research and completing section B, you have selected the processed fruit and vegetables market to target with your eco-innovation services. Although this market does not have as high environmental impact as the meat, dairy or fish markets, it has a high potential for improvement due to the large amount of waste generated across all stages in the value chain. This is also a market with a high social impact. The market growth is stable and there is a significant potential for companies to enter new markets. You have also learned that the fruits and vegetables processing market is a high priority within the National Development Plan. The Plan suggests several measures to strengthen and support the fruit and vegetables processing sector with the aim of increasing exports of 'value-added products' rather than raw produce. Several companies serving the processed fruits and vegetables market showed potential for eco-innovation, obtaining high scores in Section C of the *Target Identification* template.

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BACKGROUND INFORMATION

Overview the agri-food value chain

To support Service Providers (SPs) in identifying markets and companies suitable for eco-innovation, this section will provide an overview of the structure of the agri-food sector and its subsectors (shown in Figure 1), as well as the agri-food value chain.

The agri-food sector consists of two major parts:

- **Primary production** consists of all activities at the farming level and is responsible for producing raw materials for the processing industry or fresh products that are sold on the consumer market.
- **Agro-industry** is defined as activities beyond the farm gate. These activities often include transforming food raw materials from primary production into value added food products.

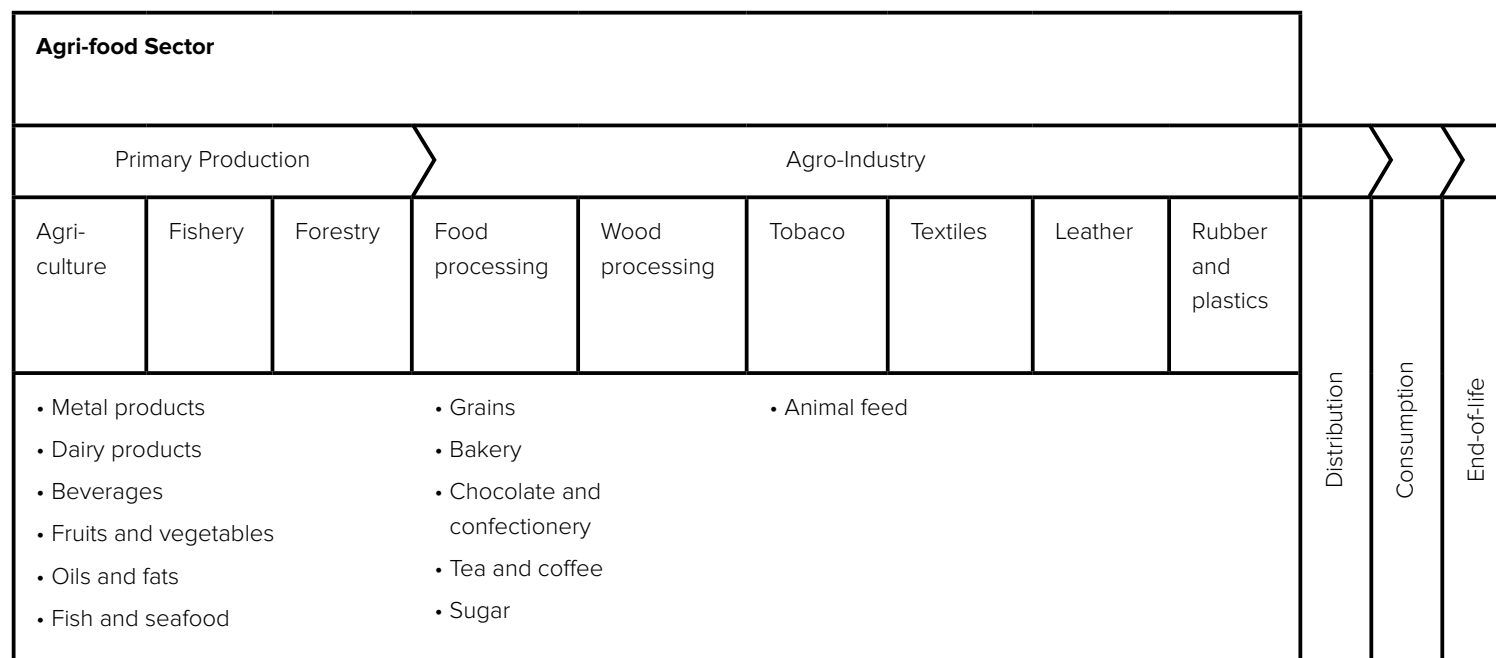


Figure 1. Overview of the agri-food sector structure

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A simplified schematic representation of a typical agri-food value chain can be seen in Figure 2 with a short explanation below.

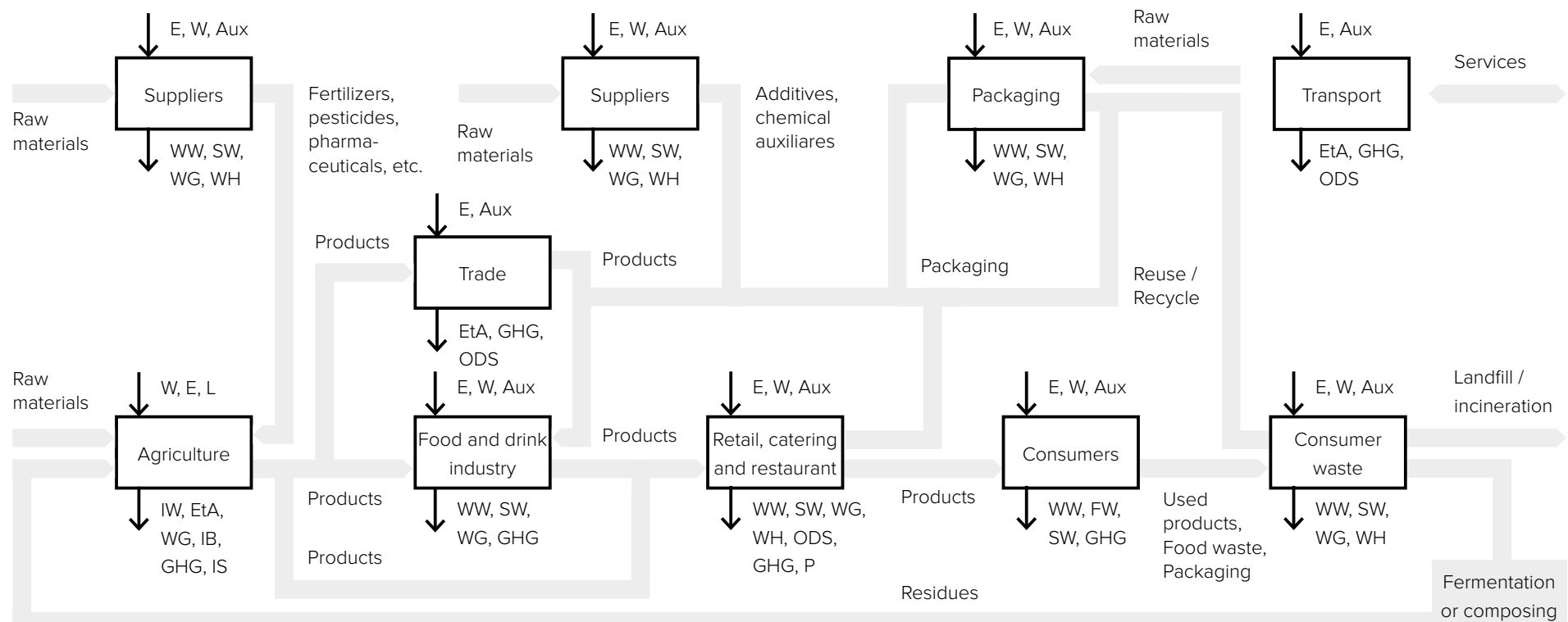
- **Raw material Production** - includes all on-farm agricultural activities as well as fishing and hunting.
- **Storage and handling** - a transition phase, for example when the crops are stored after being harvested or transportation of animals ready for slaughter. The phase ends when raw material reaches the food manufacturing facility or food distributor in the case of selling fresh agricultural products. Activities in this phase may include washing, cold storage and packaging.
- **Processing and packaging** - in this phase the raw materials are transformed into a finished product (ready to eat or ready-to cook), through food processing operations.
- **Distribution and market** - in this phase the product from the food processing facility is transported and distributed to reach the end consumer. Retailers, wholesalers, and restaurants are actors in this phase of the food value chain. Particularly important to mention is the increasing influence of the retail sector on the whole agri-food sector.
- **Consumption** - when the food products reach the consumer, some are consumed in their present form (ready to eat), while other are prepared according to specific culinary practices. This includes all the home cooking processes, such as boiling, frying or grilling.
- **End-of-life** – this phase is concerned with the disposal of agri-food products that are not/not entirely consumed, as well as disposal of the packaging materials. Typical end of life solutions for the agri-food sector include: reuse, recycle, composting, incineration, fermentation, and landfill.



Figure 2. Generic food value chain

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Figure 3 shows a detailed agri-food value chain including the flows of all important inputs and outputs. This is still a general representation, as different markets will have different value chains.



Legend

Inputs: E: Energy Aux: Auxiliaries
W: Water L: Land

Outputs: WW: Waste water P: Packaging materials
WH: Waste heat ODS: Ozone Depleting Substances
IS: Impact on soil WG: Waste Gas (diffuse emissions)

IW: Impact on water IB: Impact on biodiversity
SW: Solid waste FW: Food waste
EtA: Emissions to air EtA: Green House Gases

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TIPS & TRICKS

ANALYSE END MARKETS TO IDENTIFY TRENDS IN SUB-SECTORS AND VALUE CHAINS

Since the chemical industry is typically integrated in other industrial value chains (e.g. automotive, agriculture, etc.), you may want to list important end markets (domestic and export) served by each chemical subsector in order to systematically include sustainability impacts over the full lifecycle of the products (goods or services) delivered by the sector. In addition, including the end markets in your analysis can help you to understand the market trends affecting each subsector. Prioritize the value chains containing end markets in which sustainability issues impact business decisions.

LOOK FIRST AT MARKETS WITH HIGH SALES AND OPPORTUNITIES FOR PRODUCT DIFFERENTIATION

It may be easier to make addressing sustainability issues profitable in markets with both relatively high sales and also significant product differentiation. For example, specialty and fine chemical markets can offer more sustainability business opportunities than commodity chemicals. In contrast to commodity chemicals, specialty and fine chemicals are sold according to their functionality and significant amounts of differentiation exist between products. Therefore, markets for specialty and fine chemicals are commonly organized according to application, resulting in numerous niche

markets in which offering eco-innovation services can provide a competitive edge. The following markets typically account for the largest shares of specialty chemicals (HIS Markit, 2016):

- specialty polymers
- industrial and institutional (I&I) cleaners
- construction chemicals
- electronic chemicals
- flavours and fragrances.

IDENTIFY OPPORTUNITIES BY UNDERSTANDING HOW CHEMICAL PRODUCTS ARE USED BY DIFFERENT CUSTOMERS AND END CUSTOMERS

Many chemical products are intermediates that are processed further by chemical companies located downstream in the value chain. For example, ethylene glycol is used as antifreeze and hydraulic brake fluid. However, additional processing yields many derivatives used as emulsifiers in the application of fungicides and insecticides; as well as additives in the textile, pharmaceutical, and cosmetic industries. each subsector.

UNDERSTAND THE FUNCTIONALITY THE CHEMICAL PROVIDES TO EACH CUSTOMER WHEN ANALYSING THE VALUE CHAIN FOR ECO-INNOVATION OPPORTUNITIES

Customers use different chemicals to achieve a desired functionality. Ask how a specific chemical may contribute to a finished product (e.g. textile cleaning or bleaching), or what physical or chemical functionality a substance has in a product (e.g. biocide, flame retardant). For example, the functional chemicals used in the cosmetics markets include antioxidants, surfactants, emulsifiers, natural oils, UV filters, and actives (e.g. anti-aging ingredients). Furthermore, some chemicals possess

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properties of value to many different markets possibly offering more opportunities for eco-innovation. For example, BHT (2,6-di-tert-butyl-4-methylphenol) is an antioxidant used in cosmetics, food, fuel, lubricant, paints, plastics, pharmaceuticals, and rubber products (Pflug, 2013),

USE INTERNATIONAL BENCHMARKS TO IDENTIFY CHEMICAL MARKETS WITH HIGH POTENTIAL FOR IMPROVEMENT IN ENVIRONMENTAL PERFORMANCE

Table 1 provides an overview of material efficiency for selected subsectors of the German chemical industry and demonstrates that even best practice techniques in the chemical industry can generate significant waste (e.g. non-reacting components, such as solvents or process water commonly leave a chemical plant as waste). Investigate if the subsectors in your region also face similar resource efficiency and pollution challenges (e.g. pigments and dyestuffs, plant protection).

Table 1: Stoichiometric and material efficiency in selected German chemical subsectors Steinbach, 2013).

Selected subsectors	Stoichiometric Conversion (%)	Material Efficiency (%)
Pharmaceuticals*	86	20
Pigments and Dyestuffs	88	26
Plant Protection	89	36
Specialty Chemicals	90	62
Commodity Chemicals	90	76
Industry Average	88	38

* Regulations typically restrict the optimisation of processes and changing of recipe in the pharmaceuticals subsector

→ Refer to *Background Information* for more benchmarks on resource use and pollution for selected chemical subsectors.

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LEARNING CASE STUDY OF TARGET IDENTIFICATION

A - Sector-level analysis

Sector name: Textile

Analysis of chemical products' value chain using the *Target Identification* Template indicated that the textiles market has high potential for eco-innovation and was selected as a target market to acquire a client.

Research showed that chemicals are manufactured and used in various stages of the textiles value chain:

- Agrochemicals are used in the production of cotton, petrochemicals in the production of synthetic fibres;
- Solvents as well as organic/inorganic pigments, dyestuff, and additives for manufacturing printing inks and dyes, as many inks and dyestuff contain very hazardous substances
- Bleaches, acids, bases, oxidizers, surfactants, stabilizers, dyes (various types), inks, finishing polymer precursors and catalysts etc. used in the wet processing of textiles

In particular, research showed that the textiles value chain has many environmental and social impacts, making it a high-value target for eco-innovation. Below are some examples of these impacts

- The textile industry uses approximately 25% of all the world's chemicals (total life cycle including agrochemicals) many of which have known hazardous properties
- Some textile factories are known to employ children

- NPEOs (Nonylphenol ethoxylates) are used in the wet processing textile industry as scouring agents (e.g. for wool), wetting agents, emulsifier agents for dyes and printing inks. NPEOs degrade into nonylphenol in the environment which is a toxic to aquatic organisms and may cause harm to unborn children.
- Hazardous chemicals such as formaldehyde are found on textile products sold to consumers. Formaldehyde is often used to preserve textiles in transit and may cause cancer.
- Cotton, used to manufacture cotton apparel, is one of the most pesticide and water intensive crops (150 g pesticides and 2200 L water for one cotton shirt) and is often grown in (semi-)arid regions leading to water scarcity and/or salinization of the soil (degradation of ecosystems)

Furthermore, the regional market grew moderately strong over the past 3 years (approximately 4% per year) and some value chain pressures promoting sustainable business practices were identified for different customer (buyer) segments. In particular, some consumer segments are requesting fair and eco-labelled textiles, and many multinational brands are demanding that textile manufactures adhere to a Restricted Substances List (RSL).

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BACKGROUND INFORMATION

Eco-innovation in the chemical products' value chain is a process by which businesses integrate sustainability principles in their business strategies, which have a direct influence on their products (chemicals or services) and promote technological and operational innovations to improve business productivity, growth and competitiveness in the value chain. Applying sustainable chemistry principles can support the technical implementation of eco-innovation in the chemical products' value chain and create new opportunities or overcome barriers for companies serving this value chain.

Sustainable chemistry seeks to improve the efficiency with which natural resources are used to meet human needs for chemical products and services. It encompasses the design, manufacture and use of efficient, effective, safe and more environment-friendly chemical products and processes. Sustainable chemistry stimulates innovation across all sectors to design and discover new chemicals, production processes, and product stewardship practices that will provide increased performance and value while meeting the goals of protecting and enhancing human health and the environment (OECD, 2016).

Building on these principles and the methodology presented in the Eco-innovation Manual, this supplement provides chemical products' value chain-specific information to advance eco-innovation of companies within this value chain. It is complementary to the Eco-innovation Manual and not to be used as a stand-alone guide. Similarly to the Eco-innovation Manual, the supplement makes use of a learning case study of a fictional company in a developing country (Tip Top Textiles Co.) to illustrate practical examples of the methodology being presented.

Understanding the chemical industry

The chemical industry is a process industry consisting of companies that convert raw materials through synthesis or formulation processes into intermediate or finished chemical products.

The products of the chemical industry can be divided into the following subsectors:

Commodity chemicals consisting of:

- Petrochemicals
- Basic chemicals
- Polymers
- Specialty chemicals
- Fine chemicals
- Consumer chemicals

The manufactured chemicals are sold to industrial customers and consumers for direct consumption (e.g. solvents, detergents, cosmetics, etc.) or to other industries to be further processed into finished products (e.g. plastic components for the automotive industry, construction materials, etc.) which are then sold to end market consumers.

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Globally, the largest industrial end markets for chemicals include construction, electronics, household, paper and packaging, and automotive. Each end market can have different segments, for example paper and packaging can have different market segments, such as printing, plastic packaging, or toiletries – all of which could involve multiple chemical subsectors as value chain actors.

The chemical industry consists of several value-adding activities, which include Research and Development (R&D), master-batch formulation, packaging (for industry and consumers), logistics, customer prototyping, and optimisation of other industrial user processes (see Figure 1)

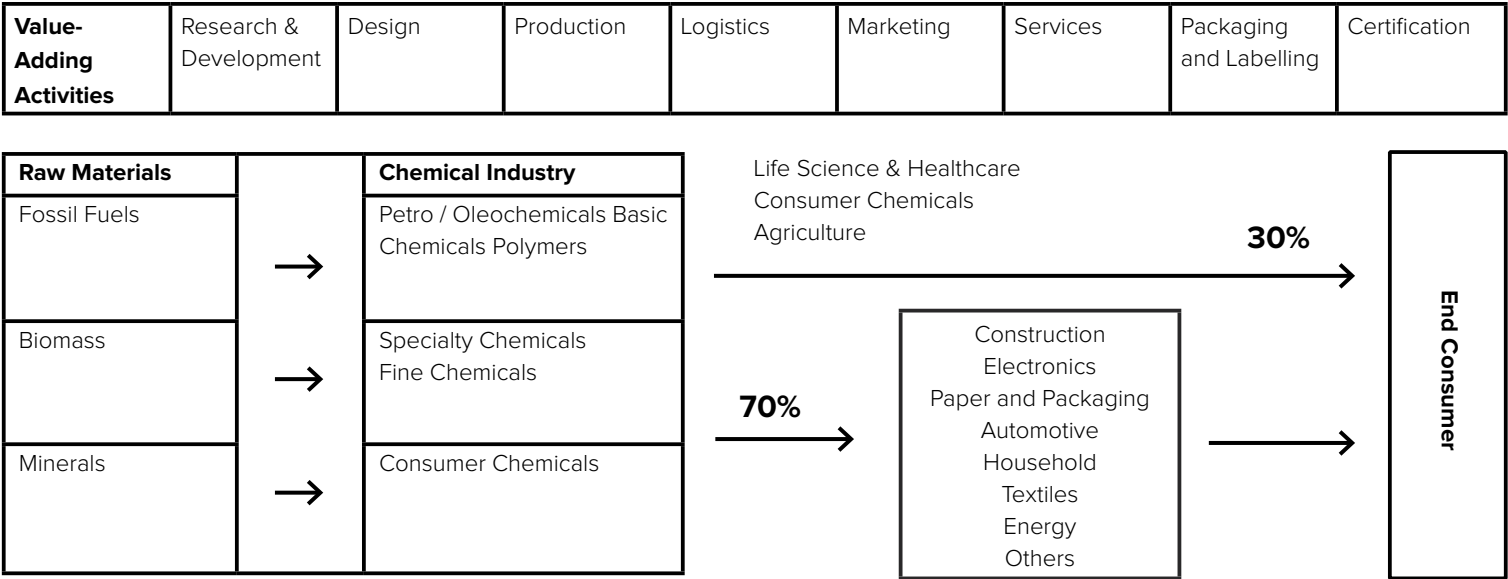


Figure 1. Simplified representation of the chemical products' value chain

Table 2. summarises some of the key features of commodity, specialty, and fine chemicals, such as chemical type (substance or mixture),

production mode (continuous or batch), volume and price, and value proposition. You can use this table as a starting point to help you understand how subsectors and markets operate and how they deliver value to their clients.

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Table 2: Some key features of commodity, speciality, fine, and consumer chemicals (authors elaboration based on (Pollak, 2011))

Key features	Commodity chemicals	Speciality chemicals	Fine chemicals	Consumer chemicals
Chemical type	Single pure chemical substances, standardised	Mixtures of one or more fine chemicals	Single pure chemical substances, complex	Mixtures of one or more fine chemicals
Plant type	Produced in dedicated plants	Formulated, typically multi-purpose plants	Produced in multi-purpose plants by chemical or biotechnology processes	Formulated, typically separate plant lines for liquid, semi-solid, and solid products.
Production mode	Produced often in continuous	Produced normally in batch, variable reactor size	Produced in batch, median reactor size 4-6 m ³	Produced normally in batch, variable reactor size
Volume and price	Large volume Low price (>US\$1/kg), cyclic and fully transparent	Variable	Low vol. (<1000 Mtpa) High price (>US\$10/kg)	Variable
Application	Many applications	Variable, also for consumers outside the chemical industry	Few applications	Exclusively for consumers
Examples	e.g. petrochemicals, basic chemicals, heavy organic and inorganic chemicals, (large-volume) monomers, commodity fibres, plastics	e.g. agrochemicals, dyestuff, food additives, enzymes, specialty polymers	typically patented, as drug or an active ingredient in an agrochemical or for further processing in chemical industry	e.g. household cleaning products, laundry detergents, anti-aging cream, make-up, shampoo.
Value proposition	Sold on specifications	Sold on performance properties “what they can do”	Sold on specifications (functional performance) “what they are”	Variable depending on market. Sold on cost, performance and brand image

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Some chemicals are manufactured in continuous processes while others are produced in batch processes. The decision for operating in continuous or batch mode depends on many factors, mainly relating to economy of size.

Categorization of the chemical industry subsectors, markets and submarkets

The following provides a detailed categorization of markets in the chemical industry and can be used to help you identify potential markets for your eco-innovation services.

Commodity chemicals

Petrochemicals / Oleochemicals

- Olefins, polyolefins
- Aromatics
- Biofuels

Basic chemicals

- Petrochemical derivatives and solvents
- N-Inorganics, other inorganics
- Acids/bases
- Industrial gases

Polymers

- Commodity polymers
- Thermoplastics
- Engineering plastics
- Synthetic fibres

Specialty and Fine Chemicals

- Adhesives and sealants
- Agrochemical ingredients (F)
- API - Active pharmaceutical ingredients (F)
- Biotech chemicals (F)
- Catalysts:
 - Petroleum refining
 - Chemical processes

- Emission control
- Construction chemicals:
 - Concrete and cement
 - Corrosion protection
 - Elastomeric roof coating
 - Exterior insulation and finish systems
 - Industrial nonwovens
 - Insulation
 - Roof and siding
 - Sealing and bonding
 - Waterproofing applications
- Cosmetic additives
- Electronic chemicals:
 - Semiconductors and IC processing chemicals
 - Printed circuit board chemicals
- Explosives
- Flavours and fragrances (F)
- Feed additives (F)
- Food additives (F)
- Imaging chemicals and materials
- Industrial and institutional cleaners for:
 - Commercial markets
 - Electronic components
 - Fabricated metal products
 - Food and beverage processing
 - Plastics processing

Notes: (F) denotes a market in the fine chemicals sector

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- Laboratory chemicals
- Leather chemicals
- Lubricants and lubricant additives
- Membrane material
- Mining chemicals
- Nonwoven fabrics
- Nutraceutical ingredients (F)
- Oil field chemicals
- Packaging and flexible packaging
- Paints and coatings:
 - Architectural
 - Automotive and transportation
 - Decorative
 - Industrial
 - Traffic coatings
- Paper chemicals
- Pesticides
- Plastic additives and plastic compounding
- Pharmaceutical intermediates (F)
- Polishing and plating chemicals (for metals and plastics)
- Printing inks
- Rubber and rubber processing chemicals
- Speciality coatings:
 - High performance anti-corrosion
 - Radiation curable coatings
 - Thermosetting powder
- Speciality polymers:
 - Engineering thermoplastics
 - High-performance thermoplastics
 - Specialty films
- (Specialty) Surfactants:
 - Water soluble polymers
- Textile chemicals and dyes
- Water management chemicals
- Wood treatment chemicals

Consumer Chemicals

Household chemicals

- Household cleaning products
- Dishwashing
- Laundry and fabric care

Healthcare and life sciences

- Prescription medicines
- Diagnostic testing
- Consumer health products:
 - Pain relief
 - Cough, cold, and fever relief
 - Health enhancers
 - Vitamins, minerals, nutrients

Cosmetics

- Skin products (e.g. skin care cream, cleansers, make-up, sun care, etc.)
- Hair and scalp products (e.g. shampoo, colouring, styling, etc.)

- Nail and cuticle products (e.g. nail polish, nail polish remover, etc.)
- Oral hygiene products (e.g. toothpaste, mouthwash, etc.)

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Benchmarks on environmental performance for selected chemical subsectors

The German chemical industry is one of the largest in Europe and its highly competitive on a global scale. The following tables provide the examples of benchmarks on environmental performance from German chemicals companies in various chemical manufacturing subsectors, specifically waste residue, solvent and halogen consumption, waste water emissions as well as greenhouse gas emissions. It is ideal to use benchmarks when evaluating environmental impacts of specific subsectors in the chemical industry. For example, as seen in Table 3 the manufacturing of pigments and dyes tends to have highest environmental impacts with respect to water consumption, whereas the manufacturing of pharmaceuticals is especially environmentally harmful in terms of solvent consumption. As a result, the highest ranking means that the subsector has the highest resource intensity and corresponding environmental impact for that category.

Table 3: Average amount of waste residue incinerated by German chemical companies in selected chemical subsectors (Steinbach, 2013)

Selected subsectors	Inorganic material [kg/t Product]	Organic material [kg/t Product]	Water [kg/t Product]
Pharmaceuticals	150	3,600	1,400
Pigments and Dye stuffs	1	100	5
Plant Protection	90	330	620
Specialty Chemicals	1	40	5
Commodity Chemicals	5	20	130

Table 4: Average amount of process wastewater treated in on-site wastewater treatment plants by German chemical companies in selected chemical subsectors (Steinbach, 2013).

Selected subsectors	Inorganic material [kg/t Product]	Organic material [kg/t Product]	Water [kg/t Product]
Pharmaceuticals	590	320	5000
Pigments and Dye stuffs	3600	480	72500

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Plant Protection	630	160	8200
Specialty Chemicals	120	40	1400
Commodity Chemicals	1	20	1900

Table 5: Average amount of solvent consumption, water consumption, and halogen waste production by German chemical companies in selected chemical subsectors (Steinbach, 2013).

Selected subsectors	Solvent Consumption [kg/t Product]	Water Consumption [kg/t Product]	Halogen [Input, kg/t product; % Input as waste]
Pharmaceuticals	3200	5400	363 Kg; 78%
Pigments and Dyestuffs	700	71200	368 Kg; 88%
Agrochemicals	250	6400	364 Kg; 74%
Specialty Chemicals	100	1500	59 Kg; 75%
Basic Chemicals	0	1900	-

Table 6: Average amount of waste material conversion [kg/t product] excluding water (organic fraction in %) by German chemical companies in selected chemical subsectors (Steinbach, 2013).

Selected subsectors	By-products	Secondary raw materials
Pharmaceuticals	320 (ca. 99%)	60 (ca. 55%)
Pigments and Dyestuffs	50 (ca. 30%)	905 (ca. 40%)
Plant Protection	410 (ca. 55%)	35 (ca. 40%)
Specialty Chemicals	150 (ca. 40%)	20 (ca. 80%)
Commodity Chemicals	170 (< 10%)	5 (ca. 35%)

Table 7: Average carbon dioxide emissions from production and waste treatment [kg CO₂/ t product] by German chemical companies in selected chemical subsectors (Steinbach, 2013).

Selected subsectors	Production (exhaust air)	Combustion of residue	Wastewater treatment	Total
Pharmaceuticals	15	8620	550	9185
Pigments and Dyestuffs	10	210	920	1140
Agrochemicals	50	660	270	980
Specialty Chemicals	15	120	105	270
Basic Chemicals	30	60	30	120

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Table 8: Average halogen input and output [kg/t product] for German chemical companies in selected chemical subsectors (Steinbach, 2013).

Selected subsectors	Input Primary feedstock	Output Product	Waste
Pharmaceuticals	363	79	284; 78%
Pigments and Dyestuffs	363	43	325; 88%
Plant Protection	364	94	270; 74%
Specialty Chemicals	59	15	44; 75%

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TIPS & TRICKS

GUIDE COMPANY SELECTION USING TARGETED QUESTIONS

You may consider using the following questions to help identify the type of company you should be targeting in the selected markets:

- Which end markets are most attractive from a Value Proposition perspective?
 - What type of companies in the metals value chain are providing goods or services to these end markets and where are they located in the value chain?
 - Which value chain steps create the most value?
- Based on this, you can pose some additional company specific questions:
- What key sustainability capabilities can metals sector companies in

these value chains or markets offer to achieve a competitive advantage?

- What is the potential for the metals sector company to engage value chain partners and offer sustainable solutions to end markets?

USE ENVIRONMENTAL IMPACT DATA TO SELECT RELEVANT SUB-SECTORS TO TARGET

Table 1 provides information on the environmental impacts of specific subsectors in the metals sector, which can help with the market-level analysis described in the Eco-innovation Manual. For example, the manufacturing of electrical equipment tends to have

high environmental impacts, with respect to energy and water consumption as well as waste water and CO₂ emissions, whereas the fabrication of metal products tends to have high environmental impacts with respect to material and water consumption.

Table 1: Comparison of resource efficiency and environmental impact of metals industry subsectors (Note: Rankings are based on data from Germany, 2010 [VDI, 2013])

Selected subsectors	Energy	Material	Water	Waste water	CO2-Emm.
C25-Fabrication of metal products	2	5	4	5	1
C26-Manufacture of computer, electronic & optical products	4	2	1	1	3
C27-Manufacture of electrical equipment	5	4	6	6	5
C28-Manufacture of machinery	3	3	5	4	4
C29-Manufacture of motor vehicles	1	1	3	3	2
C30-Manufacture of other transport equipment	6	6	2	2	6

Notes: The ranking is assigned vertically. The highest ranking means that subsector has the highest resource intensity and therefore the highest environmental impact for that category. (1=lowest impact, 6=highest impact).

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TAP INTO CONSUMER DEMAND

End-market demand in the metals value chain is showing a growing need to address sustainability challenges arising from emerging trends such as urbanization and changing consumption patterns (e.g. consumer lifestyle). It is therefore possible to picture opportunities for companies in the metals value chain in supplying the expanding sustainable buildings end-market. This includes mainstreaming a range of regionally appropriate practices and technologies that promote on-site renewable energy, water, and resource efficiency. More specifically, this could mean an expansion of the market for renewable, recycled and resource efficient metal materials and

the development of newer, more durable, and high-strength metal products, as well as an increasing demand for energy efficient cooling and heating technologies, etc. LEED (Leadership in Energy and Environmental Design), for example, is already certifying more than 139,000m² of building space every day in more than 130 countries and it is only one of several green building standards around the world [UN Environment, 2013]. For more information on these and related issues, you can refer to UN Environment's work on promoting related resource efficient and sustainable consumption and production (SCP) including activities on Sustainable Cities and Buildings.

CONSIDER MULTIPLE ECO-INNOVATION OPPORTUNITIES IN AN EXPANDED METALS VALUE CHAIN

The various metals value chain subsectors serve a wide spectrum of end markets linked to economic development, such as the automotive, construction, energy, electrical & electronic equipment (EEE) industries. An example of a viable market for eco-innovation implementation services could be companies servicing the automotive industry, since this sector is faced with many pressures (e.g. regulation, market demand, health and environmental issues, profitability) that drive the industry to deliver new sustainable mobility solutions. Companies that wish to cooperate with

the automotive industry need to find alternative solutions (e.g. products and services) and create business models that can save resources, improve recycling strategies, and increase profitability. The metals sector has highly integrated and globalized value chains, thereby providing opportunities for developing and emerging economies to access local markets as well as regional and international export markets.

UNDERSTAND THE SUSTAINABILITY CRITERIA USED BY CUSTOMERS

When performing your market research, you may also identify how customers judge sustainability performance and whether they have established certain sustainability criteria. For example, the EU market offers potential for export manufacturers of metal parts and components that are able to supply advanced components customized according to the need of end-users, especially if they are able to do coating treatments in-house, following process certification according to ISO 14001 and being compliant with the RoHS Directive.

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BACKGROUND INFORMATION

Most metals are used in alloy form, which is a material composed of two or more metals, or a metal and a non-metal.

The metal life cycle starts with mining of raw material (i.e. metal ores) and refining them for the process of primary metal manufacturing. The primary metals (e.g. iron, steel and ferro-alloys, and non-ferrous metals: aluminium, lead, zinc, tin, copper, etc.) go through processes of fabrication and/or manufacturing resulting in different metal end products ready for use that are provided to business customers as well as consumers. Once metal products have reached the end-of life, they can be recycled, used in cycles of another metal, such as copper wires mixed into steel scrap, or disposed at the landfill as waste. Figure 1 provides a simplified metal life cycle, including how discarded material enters the cycle of another metal since many end products (e.g. automobiles, EEE, etc.) usually consist of different materials including diverse metals. However, it is important to mention that the metals life cycle can take different paths depending on types of metals and end products.

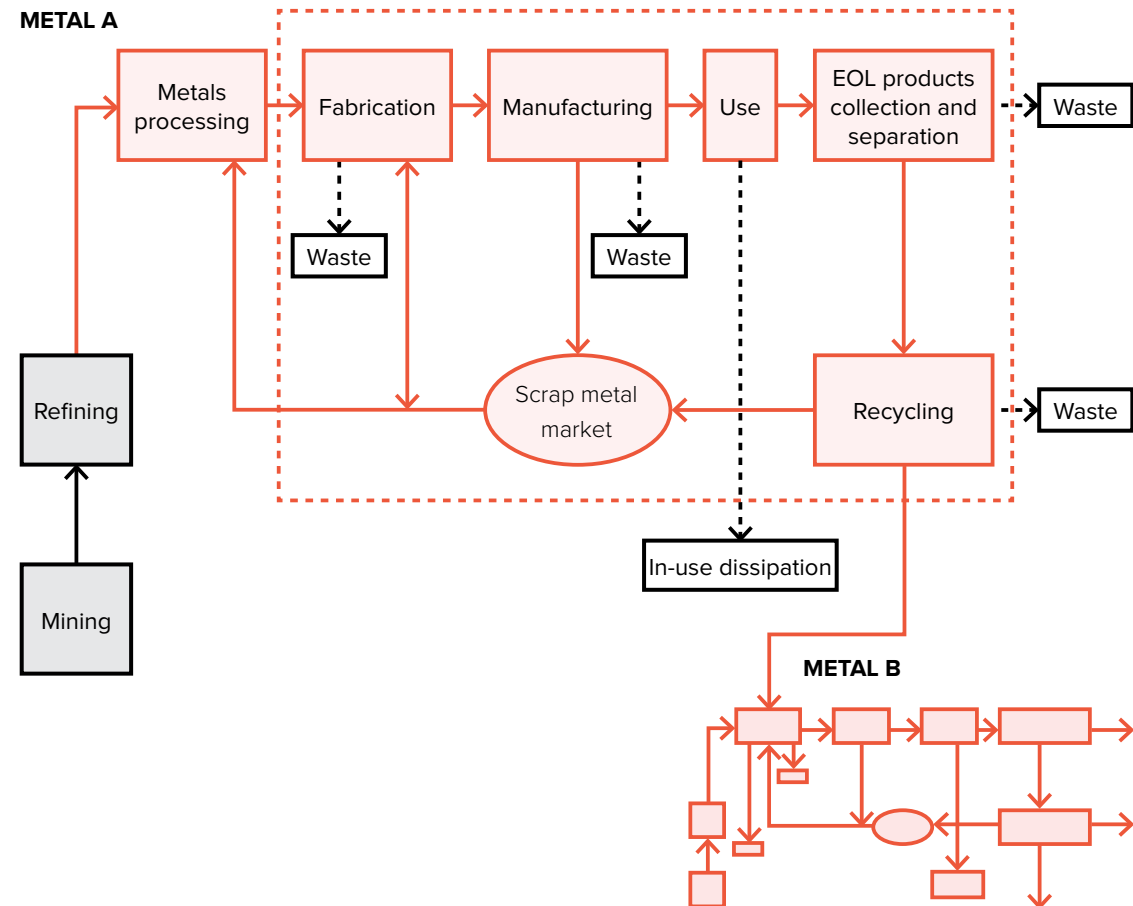


Figure 1. Simplified metal life cycle including interaction of different metals (adapted from [UN Environment Metals, 2011]). The dashed box demarcates the phases of the metal life cycle that are the focus of this supplement.

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Figure 2 illustrates specific processes within fabrication and manufacturing and provides a non-exhaustive list of some product,

production and management opportunities for particular processes including management and design aspects of the production.

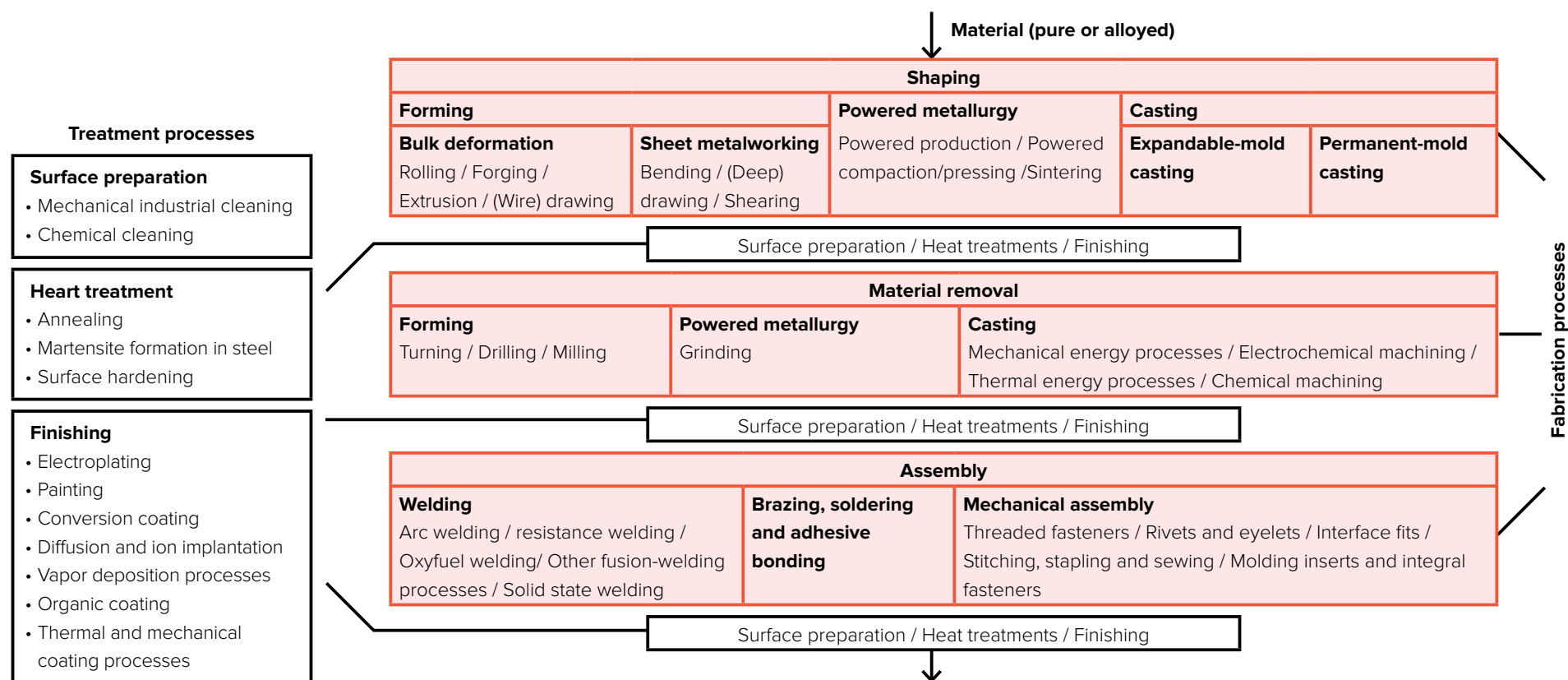


Figure 2: Overview of manufacturing categories and sub-processes in the metal processing sector (fabrication and manufacturing)

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In the metals sector, the focus will be on the fabrication and manufacturing of metal-based products. The table below provides a non-exhaustive overview of different metal subsectors according to the UN International Standard Industrial Classification of All Economic Activities (ISIC), which will be focused on in this supplement.

Table 2. UN International Standard Industrial Classification of All Economic Activities (ISIC)

ISIC Code & General Description	Example subsectors
<p>C24 – Manufacture of basic metals</p> <p>This division includes the activities of smelting and/or refining ferrous and non-ferrous metals from ore, pig or scrap, using electro-metallurgic and other process metallurgic techniques. This division also includes the production of metal alloys and super-alloys by introducing other chemical elements to pure metals. The output of smelting and refining, usually in ingot form, is used in rolling, drawing and extruding operations to make products such as plate, sheet, strip, bars, rods, wire, tubes, and pipes as well as hollow profiles. Further, the output can also be in molten form in order to make castings and other basic metal products.</p>	<ul style="list-style-type: none"> • Production of granular iron and iron powder • Production of steel in ingots or other primary forms • Production of semi-finished products of steel • Manufacture of hot-rolled and cold-rolled flat-rolled products of steel • Manufacture of hot-rolled bars and rods of steel
<p>C25 – Manufacture of fabricated metal products¹</p> <p>This division includes the manufacture of “pure” metal products, such as parts, containers and structures, usually with a static, fixed function, as opposed to the following divisions 26-30, which cover the manufacture of combinations or assemblies of such metal products, sometimes in combination with other materials, into more complex units that, unless purely electrical, electronic or optical, work with any moving parts.</p>	<p>Manufacture of structural metal products</p> <p>Manufacture of tanks, reservoirs and containers of metal</p> <p>Manufacture of steam generators, except central heating hot water boilers</p> <p>Forging, pressing, stamping and roll-forming of metal; machining</p> <p>Treatment and coating of metals</p>

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ISIC Code & General Description	Example subsectors
<p>C26 – Manufacture of computer, electronic and optical products</p> <p>Manufacture of computers, computer peripherals, communications equipment, and similar electronic products, as well as the production of their components. The design and use of integrated circuits and the application of highly specialized miniaturization technologies are characterizing the production processes of this division.</p> <p>The division also contains the production of consumer electronics, measuring, testing, navigating and control equipment, irradiation, electro-medical and electrotherapeutic equipment, optical instruments and equipment, as well as the manufacture of magnetic and optical media.</p>	<ul style="list-style-type: none"> • Manufacture of electronic components and boards • Manufacture of computers and peripheral equipment • Manufacture of communication equipment • Manufacture of consumer electronics • Manufacture of measuring, testing, navigating and control equipment • Manufacture of optical instruments and photographic equipment • Manufacture of magnetic and optical media
<p>C27 - Manufacture of electrical equipment</p> <p>Manufacture of products that generate, distribute and use electrical power. Also included is the manufacture of electrical lighting, signalling equipment and electric household appliances.</p>	<ul style="list-style-type: none"> • Manufacture of electric motors • Manufacture of batteries and accumulators • Manufacture of electric lighting equipment • Manufacture of domestic appliances
<p>C28- Manufacture of machinery and equipment</p> <p>This division includes the manufacture of machinery and equipment that act independently on materials either mechanically or thermally or perform operations on materials, such as handling, spraying, weighing or packing, including their mechanical components that produce and apply force, and any specially manufactured primary parts. This includes the manufacture of fixed and mobile or hand-held devices, regardless of whether they are designed for industrial, building and civil engineering, agricultural or home use. The manufacture of special equipment for passenger or freight transport within demarcated premises also belongs within this division.</p> <p>C33 – Repair and installation of machinery and equipment</p> <p>This division includes the specialized repair of goods produced in the manufacturing sector with the aim to restore machinery, equipment and other products to working order.</p>	<ul style="list-style-type: none"> • Manufacture of fluid power equipment • Manufacture of pumps, compressors, taps and valves • Manufacture of ovens, furnaces and furnace burners • Manufacture of office machinery • Manufacture of power-driven hand tools • Manufacture of machinery for food, beverage and tobacco processing • Manufacture of machinery for textile, apparel and leather production • Repair of fabricated metal products, machinery and equipment • Installation of industrial machinery and equipment

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ISIC Code & General Description	Example subsectors
<p>C29-Manufacture of motor vehicles, trailers and semi-trailers</p> <p>This division includes the manufacture of motor vehicles for transporting passengers or freight. The manufacture of various parts and accessories, as well as the manufacture of trailers and semi-trailers, is included here.</p>	<ul style="list-style-type: none"> • Manufacture of motor vehicles • Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers • Manufacture of parts and accessories for motor vehicle
<p>C30- Manufacture of other transport equipment</p> <p>This division includes the manufacture of transportation equipment such as ship building and boat manufacturing, the manufacture of railroad rolling stock and locomotives, air and spacecraft and the manufacture of parts thereof</p>	<ul style="list-style-type: none"> • Building of ships and floating structures • Manufacture of railway locomotives and rolling stock • Manufacture of air and spacecraft and related machinery • Manufacture of motorcycles • Manufacture of bicycles
<p>C31- Manufacture of furniture</p> <p>This division includes the manufacture of furniture and related products of any material except stone, concrete and ceramic. The processes used in the manufacture of furniture are standard methods of forming materials and assembling components, including cutting, molding and laminating. The design of the article, for both aesthetic and functional qualities, is an important aspect of the production process.</p>	<ul style="list-style-type: none"> • Manufacture of chairs and seats • Manufacture of office furniture • Manufacture of kitchen furniture
<p>C32- Other manufacturing</p> <p>This division includes the manufacture of a variety of goods not covered in other parts of the classification. Some groups contain primarily metal-based products.</p>	<ul style="list-style-type: none"> • Manufacture of jewellery, bijouterie and related articles • Manufacture of musical instruments • Manufacture of medical and dental

PR.1 Evaluate potential markets

Important sources of information about the metals sector can be found at:

Metals sector useful information

UN Environment International Resource Panel Global Metal Flows Working Group website includes data on up-to-date information on metal recycling and other relevant topics - <http://www.unep.org/resourcepanel/Home/tabid/106603/Default.aspx>

- Metal Recycling: Opportunities, Limits, Infrastructure
- Recycling Rates of Metals, 2011
- Environmental Risks and Challenges of Anthropogenic Metals Flows, 2013, publication includes data on greenhouse gasses emissions for the metals sector and energy intensity information
- Metal stocks in society: scientific synthesis, 2010

Global Automotive Stakeholders Group (GASG) website is a good source of information related to the use of certain substances in automotive products – <http://www.gadsl.org/>

Market data

World Steel Association website provides data on steel production and current market trends – <http://www.worldsteel.org/media-centre/key-facts/1.html>

European Commission website on metals and minerals can be also consulted for data and facts related to ferrous and non-ferrous metals market – <http://ec.europa.eu/enterprise/sectors/metals-minerals>

Meeting the world's energy, material, food and water needs, 2011, McKinsey, publication

International Cadmium Association website includes interesting information about latest development in the battery industry, <http://www.cadmium.org/>

EUROBAT (Association of European Automotive and Industrial Battery Manufacturers) website includes up-to-date information related to issues of common concern for the automotive and industrial battery manufacturers, <http://www.eurobat.org/>

Funding Options for Small and Medium Size Enterprises to Finance Cleaner Production Projects and Environmentally Sound Technology Investments, 2009, UNIDO

Various consultancies specialise in the metal manufacturing sectors and provide sector specific data on markets and relevant trends, including:

- KPMG Industrial Manufacturing - <http://www.kpmg.com/global/en/industry/industrial-manufacturing/metals/pages/default.aspx>
- They also annually issue a report on metals: the Global Metals Outlook 2014 (current version)
- Roland Berger Industrial know-how - <http://www.rolandberger.com/expertise/industries/>
- PwC Metal practice - <http://www.pwc.com/gx/en/metals/>

Trends in the metals industry

Business Case for Eco-Innovation, 2014, UN Environment, publication - <http://www.unep.org/ecoinnovationproject/>

Geo-5 for Business, 2013, UN Environment, publication - http://www.unep.org/geo/pdfs/geo5/geo5_for_business.pdf

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UN Environment Resource Efficiency Programme, website - <http://www.unep.org/resourceefficiency/Home/tabid/55480/Default.aspx>

UN Environment activities on Cities and Buildings, http://www.unep.org/resourceefficiency/Portals/24147/scp/REC/Cities%20and%20Buildings%20-%20UNEP%20DIE%20Initiatives%20and%20projects_hd.pdf

Megatrends and what's on horizon, 2013, Ernst&Young - [http://www.ey.com/Publication/vwLUAssets/EY_-_Megatrends_and_what%E2%80%99s_on_the_horizon/\\$FILE/EY-com_gl_state_of_mining_and_metals.pdf](http://www.ey.com/Publication/vwLUAssets/EY_-_Megatrends_and_what%E2%80%99s_on_the_horizon/$FILE/EY-com_gl_state_of_mining_and_metals.pdf)

Trends in the mining and metals industry, 2012, ICMM, publication - <http://www.icmm.com/trends-in-the-mining-and-metals-industry>

Resource Revolution: Tracking global commodity market, 2013, McKinsey, trends survey - http://www.mckinsey.com/insights/energy_resources_materials/resource_revolution_tracking_global_commodity_markets

International Council of Mining and Metals (ICMM) website offers a wealth of information related to current trends in the metals sector – <http://www.icmm.com>

European Round Table of Industrialists (2013), Raw materials in the industrial value chain.

References

VDI, 2013: Analysis of resource efficiency potential in SMEs from manufacturing industry, 2013, VDI Centre for Resource Efficiency GmbH (VDI), Germany

UN Environment Metals, 2011: Recycling Rates of Metals, 2011

UN ISIC, 2008: United Nations (2008), International Standard Industrial Classification of All Economic Activities (ISIC), Rev.4. ISBN: 978-92-1-161518-0.

European Round Table, 2013: European Round Table of Industrialists (2013), Raw materials in the industrial value chain.

OECD Toolkit, 2011: Sustainable Manufacturing Toolkit, 2011, OECD

UN Environment, 2013: Geo-5 for Business, 2013, UN Environment, publication - http://www.unep.org/geo/pdfs/geo5/geo5_for_business.pdf