



# ChemSkills

Enabling the green and digital skills  
transformation of the chemical industry.

## Report on ChemSkills Survey Results 1<sup>st</sup> iteration - Consumer Chemicals

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## Summary

This report is part of the ChemSkills project, aiming to assess the evolving trends in the chemical industry and their impact on skills and workforce requirements. The survey was conducted by the project consortium between February and October 2024, targeting key stakeholders to gather insights on sectoral needs and offer to meet green and digital transition and gaps found in five sectors: Plastics, Consumer Chemicals, Fertilisers, Rubber, Pharmaceuticals and Petrochemicals.

A preexisting report (Chemskills, 2025) presents the results for all sectors combined. This report presents the results relative to the respondents operating – between others - within the sector of **Consumer Chemicals**. Within the 15 respondents, 2 reported to operate only within the Consumer Chemicals sector. The answers are therefore not specific to the sector. It was found that the results do not appear to differ significantly from the results of the report for all sectors.

The findings show that the responding organisations are experiencing significant changes driven by a focus on **sustainability and circular economy practices, regulatory compliance**, and the adoption of **digital technologies**. These trends align with broader global challenges, such as climate change and the need for innovation in production processes. In contrast, automation and robotics and personalization are identified as less critical trends, potentially due to the sector's focus on large-scale operations and efficiency over product customisation.

Regarding the Green skills and competency, **embodying sustainability values and acting for sustainability** were the most important skills identified. Note that the Energy efficient focus was ranked as least important. Additionally, the sustainable transition resonated with the need of trainings related to the mitigations of health and environmental risks, resources, and respect of humans and non-human's rights. This shows that for the respondents, a **sustainable transition goes beyond the control of greenhouse gases emissions**.

Soft skills are put forward and receive overall a high ranking, with **Critical thinking, Problem solving and Communication** ranking highest. The need for **flexibility and life-long learning** was put forward in a comment.

The report underscores the pressing need for upskilling and reskilling the workforce to address these changes. The **sustainability, data analytics, and cybersecurity** are viewed as the most critical digital competences and ranked above 4 (grade 1 to 5). These priorities reflect current global trends in addressing environmental concerns, leveraging data-driven strategies, and ensuring secure digital operations. But note that the other digital skills were ranked below 4, when most soft skills and green skills were ranked above 4. The relevance of the other digital skills listed (or not listed, as for instance AI which was not part of the questionnaire) might be topical – relevant for specific activities - while soft skills and green skills are seen as more necessary for the transition in a broader way.

The data suggests that generational differences in digital skills are widely acknowledged, with the majority identifying at least a minor gap. While most see this as a minor issue, a notable proportion regard it as significant, indicating a potential challenge for organizations in

leveraging digital tools effectively across all age groups. As responses show, the gender-based differences in digital skills are not widely perceived as a significant issue in most organisations. It would be interesting to see if such a generational and gender gap is perceived related to the understanding of sustainability.

**Safety-related competences** and core technical competences such as **Material Science** dominate as essential sector skills, reflecting their critical role in advancing industrial and chemical processes. **Quality Control** is also highly rated, showing the sector's focus on maintaining standards and leveraging technology for process optimization. The results of the survey show that workforce-related challenges the **availability of skilled workers** (professional and technicians) is the most urgent need for the respondents.

# 1. Identification of Respondents

This section provides detailed information on the respondents that completed the survey, including the type of organization where they operate, position in the value chain, size, market reference, country and area of operation.

Out of the 117 total responses received, 15 specifically indicated that they operate in the sector/segment “Consumer chemicals”.

Most often it was one of the areas in combination with: Petrochemicals (9x), Plastics (8x), Fertilisers/agriculture (7x), Pharmaceuticals (5x), Rubber (4x) and Other (1x). Some of the organizations stated multiple combinations. There were only two companies that stated that they were exclusively dedicated to the Consumer chemical sector.

Most of the companies were the size of large companies (7) with a headcount of more than 250 employees.

Company size - Consumer chemicals	Count
+250 (Large)	7
50-249 (Medium)	4
10-49 (Small)	2
1-9 (Micro)	1

Most organizations (47%) came from the industry.

Organization type	Count
Industry & SMEs / Industry Associations	7
Other	3
Public institutions/authorities	2
Social Partners (trade unions, unions of industrial and employers', association) Source	2
Education and training provider / VET & Associations	1

The respondents were asked to indicate the area of operation of their organisation, both in broad terms worldwide and individual EU countries. The respondents of the survey, whose organizations operate in the European Union, were asked to specify the individual countries; some of the organizations operate in multiple countries in the European Union (Figure 1). As

a result, the 14 respondents operate in 23 European countries, UK and Switzerland.

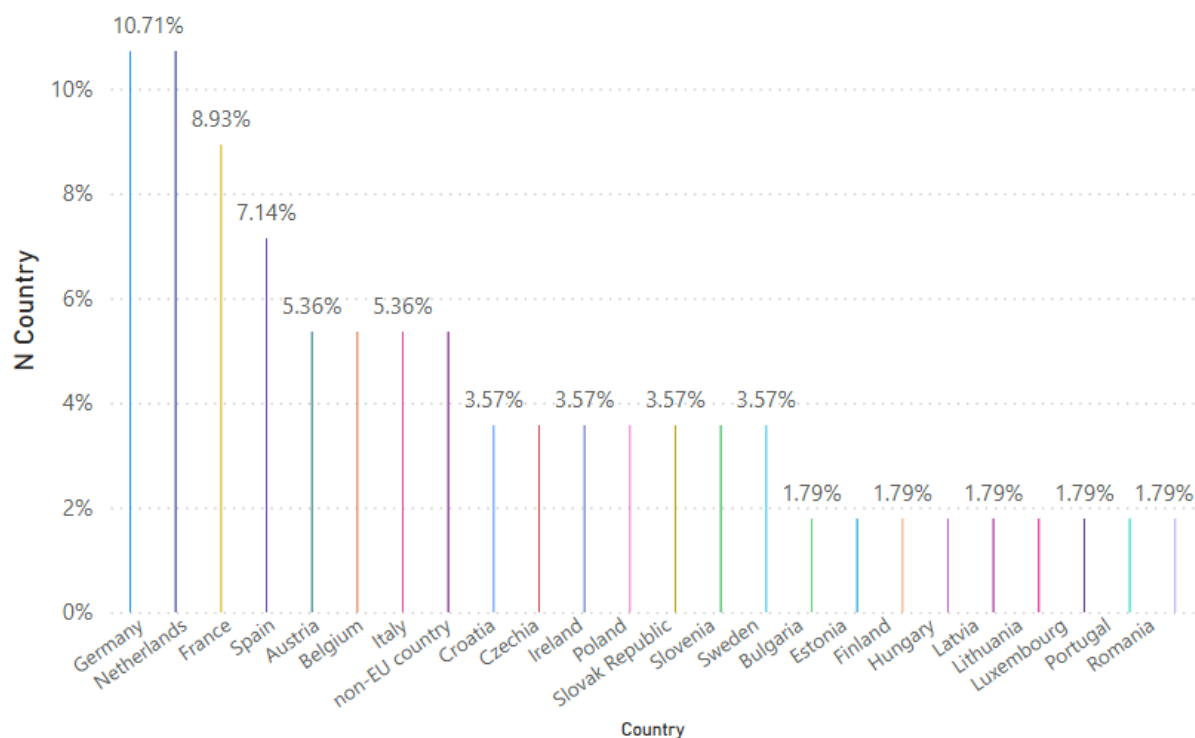


Figure 1 Geographical coverage

## 2. Sectoral Needs to Meet Green & Digital Transition

This section provides an in-depth analysis on macro topics and related sub-categories which have been identified as the main trends. Unfortunately, due to the limited number of respondents and considering that most respondents operate on several sectors, the answers do not reflect well the specific needs of the Consumer Chemicals sector.

In line with the overall survey results, “Sustainability and circular economy” and “Increased adoption of digital technologies” emerged as the primary trends and drivers influencing consumer chemicals organizations. These are followed by “Regulatory changes impacting industry practices” and the “Shift toward automation and robotics” (Figure 1).

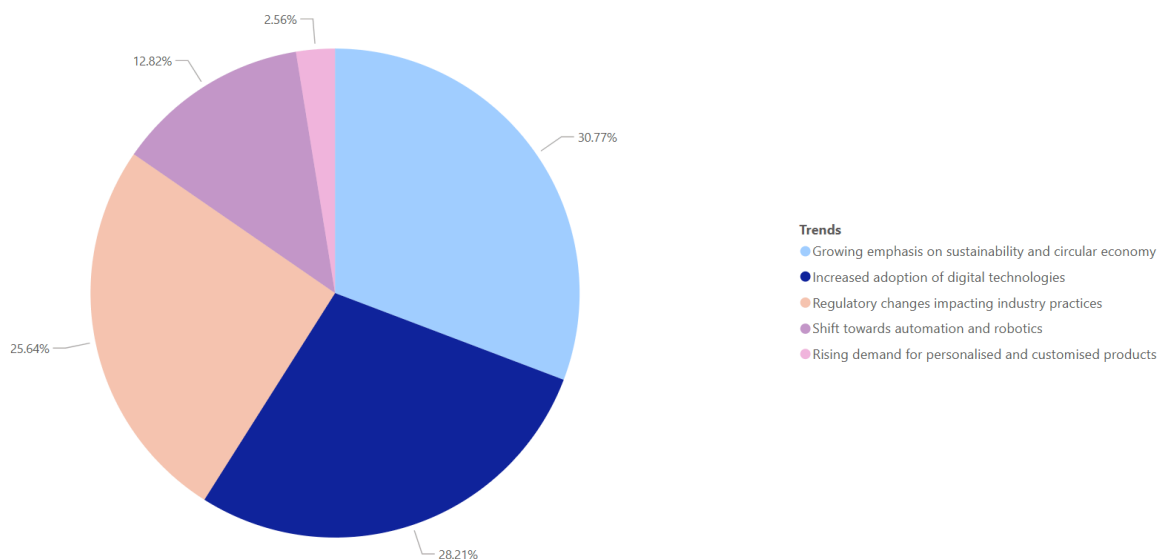


Figure 2 Current trends and drivers of change experienced

	Mean
Changes in the market transition towards the digital economy?	4.00
Changes in the market transition towards the green economy?	4.79

Consumer chemicals sector is more oriented towards the green economy transition (4.79) than the digital economy transition (4.00).

## 2.1. Sector competencies needed in Consumer chemicals

This section provides an analysis on skills and knowledge needed in the sector. A range of competence categories was given, and respondents rated the specified competences. In the category “Other“, the respondents could express their skills and knowledge not included in the range. Unfortunately, due to the limited number of respondents and considering that most respondents operate on several sectors, the answers do not reflect well the specific needs of the Consumer Chemicals sector.

### 2.1.1. Sectoral

The ranking of the different sectoral competences did not strongly differ from the ranking reported for the survey on all sectors. The main difference is that Material science ranked 3<sup>rd</sup> for this sector specific survey when it ranked 6<sup>th</sup> for all sectors together<sup>1</sup>. Two comments pointed to the need of regulatory compliance of the products, which was not on preselected as a sectoral competence and therefore not in the initial list.

<sup>1</sup> This result is reported in the overall report: Report on ChemSkills Survey Results 1st iteration in Chemical Industry

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	Mean
Safety Awareness	4.6
Process Safety and Risk Management	4.6
Material Science	4.2
Quality Control and Assurance	4.1
Chemical Processes Control and Monitoring	3.8
Chemical Process Design	3.7
Instrumentation and Process Control	3.7
Reaction Engineering	3.2
Thermodynamics and Heat Transfer	3.1
Metallurgy	2.6

On average the most desired competencies are Safety Awareness (4.6) and Process Safety and Risk Management (4.6), the least are Reaction Engineering (3.2), Thermodynamics and Heat Transfer (3.1), and Metallurgy (2.6). It is worth to mention that the difference between the most needed and the last needed is almost 2 points.

## 2.1.2. Digital

	Mean
Data analytics	4.7
Sustainability and circular economy expertise	4.1
Cybersecurity and network security	4.1
Supply chain digitization and logistics	3.8
Automation and robotics programming	3.3
Internet of Things (IoT)	3.0
Digital twin modelling and simulation	2.9
3D printing and manufacturing	2.1

On average the most desired digital competencies are Data analytics (4.7), Cybersecurity and network security (4.1) and Sustainability and circular economy expertise (4.1). The least are Internet of Things (IoT) (3.0), Digital twin modelling and simulation (2.9) and 3D printing and manufacturing (2.1). It is worth to mention that the difference between the most needed and the last needed is of about 2.5 points.

One comment pointed out to the raising importance of artificial intelligence skills (programming + use).

### 2.1.3. Soft

	Mean
Critical Thinking	4.7
Problem Solving	4.6
Communication	4.5
Safety and Ethics	4.4
Cognitive Skills	4.0
Social and Emotional Skills	4.0
Content Creation	3.4

Regarding the Soft skills the most needed are Critical Thinking (4.7) Problem Solving (4.6) and Communication (4.5) on the other hand Cognitive Skills (4.0), Social and Emotional Skills (4.0) and Content Creation (3.4) is seen as less needed. One comment pointed out the need for “flexibility, agility and life-long learning” which were not listed.

### 2.1.4. Green

The green competences were defined for the survey based on GreenComp Framework. An explanation was provided to the categories.

- Embodying sustainability values – to assess the observance of technical sustainability criteria, sustainability legal standards, environmental technology and sustainability practices
- Envisioning sustainable futures
- Acting for sustainability (know-how related to a change in the organisational structure required to support green activities and an integrated view of the firm through life-cycle management, lean production and cooperation with external actors, including customers)
- Energy efficiency focus
- Monitoring and predicting environmental impact

	Mean
Embodying sustainability values	4.6
Acting for sustainability	4.3
Envisioning sustainable futures	4.1
Monitoring and predicting environmental impact	4.0
Energy efficiency focus	3.7

The current needs of green skills needed in the consumer chemicals sector are seen as a set of focus on Embodying sustainability values (4.6) and Acting for sustainability (4.3). Overall, the answers indicated a strong importance of every aspect towards green skills.

The open answers point out that while green competences are needed, they do not need to be equally spread across the company: for instance, “*knowledge and interest in sustainability and SSbD method is essential within the enterprise but not to all employees within it*”. Also another respondent underlines that the “*link to societal challenges may vary between companies (energy, climate, health, water,...)*”.

## 2.2. Workforce needed in Consumer Chemical

The survey included a section on the workforce needed to analyse immediate and long-term need/challenge for the department/organisation/sector. The immediate challenge was defined for 1-2 years, meanwhile, the long-term one for 5-10 years. The respondents rated the importance of each suggested challenge on a scale from 1 to 5. They also did it to define which workforce in terms of job positions is needed in the sector. There were suggested following positions:

- Elementary workforce (simple and routine tasks which may require the use of hand-held tools and considerable physical effort)
- Operators (operate and monitor industrial and agricultural machinery and equipment on the spot or by remote control; drive and operate trains, motor vehicles and mobile machinery and equipment)
- Workers (apply specific technical and practical knowledge and skills to construct and maintain products, processes, services)
- Assemblers (assemble products from component parts according to strict specifications and procedures)
- Technicians (perform technical and related tasks connected with research and the application of scientific or artistic concepts and operational methods, and government or business regulations)
- Professionals (increase the existing stock of knowledge; apply scientific or artistic concepts and theories; teach about the foregoing in a systematic manner; or engage in any combination of these activities)
- Managers (plan, direct, coordinate and evaluate the overall activities of enterprises, governments, and other organisations, or of organisational units within them, and formulate and review their policies, laws, rules and regulations)

As for the general survey answer, the “availability of the workforce with the adequate skill sets” is the main concern of the respondents for now, and for the future of the industry.

	Short term (1-2 years) Mean	Long term (5-10 years) Mean
Availability of workforce with the adequate skill sets	4.3	4.3
Initial investment costs	3.7	3.3
Integration issues with existing systems	3.6	3.5
Availability of training programs for existing workforce to re-skill/up-skill	3.5	3.6

Analysing specific job positions immediately needed, the most needed are “Professionals” supposed to increase the existing stock of knowledge; apply scientific or artistic concepts and theories; teach about the foregoing in a systematic manner; or engage in any combination of

these activities. High skilled technicians and professional experts were found as key ones as other workforce categories can be found more easily.

	Short term (current) Mean	Long term (5-10 years) Mean
Professionals (increase the existing stock of knowledge; apply scientific or artistic concepts and theories; teach about the foregoing in a systematic manner; or engage in any combination of these activities)	4.0	3.9
Technicians (perform technical and related tasks connected with research and the application of scientific or artistic concepts and operational methods, and government or business regulations)	3.7	3.7
Managers (plan, direct, coordinate and evaluate the overall activities of enterprises, governments, and other organizations, or of organizational units within them, and formulate and review their policies, laws, rules and regulations)	3.4	3.4
Operators (operate and monitor industrial and agricultural machinery and equipment on the spot or by remote control; drive and operate trains, motor vehicles and mobile machinery and equipment)	3.3	3.1
Workers (apply specific technical and practical knowledge and skills to construct and maintain products, processes, services)	3.3	3.3
Elementary workforce (simple and routine tasks which may require the use of hand-held tools and considerable physical effort)	3.0	2.6
Assemblers (assemble products from component parts according to strict specifications and procedures)	2.3	2.3

According to the respondents the difference in the workforce regarding the job positions there is no difference in the short- or long-term needs. With a slightly decline of need for the future besides the Manager position.

### 3. Training Offer in the Transition in Consumer Chemicals

Questions on the Offer were also included in the survey. In the survey of the first iteration, they were focused on analyzing the current situations with training and education and what is needed for future industry transition.

The answers for the sector Consumer chemicals did not significantly differ from the overall survey :

A substantial percentage of organisations (about 50%) are already proactive in implementing training courses, which aligns with the earlier data showing a significant focus on workforce skills and training. However, the nearly equal proportion of organisations that have not yet implemented training courses highlights a gap that could potentially slow down workforce development efforts. The remaining respondents plan to implement courses shows some optimism for increased training activities, though it also suggests that these organizations need time and resources to act. The sub sector Consumer Chemicals might not have been

large enough to capture the existence of small organizations with no plans for training reflects limited interest or capability to prioritize this area, possibly requiring external support or incentives.

Training for future industry transition	Number of companies
Yes. currently implementing specific training courses	7
No. currently not implementing training courses	7
Planning to implement training course in the future	1
Total	15

The half of the companies in Consumer Chemicals are currently implementing specific training courses (7) and the other half not.

Besides courses regarding the needs for the future industry transition, the respondents listed the specific existing courses. The answers include courses which might not apply to the Consumer chemical sector (for instance “hydrogen in metallurgy”). Regarding the consumer chemical sector, it was seen that the Green transition is understood not as a transition regarding energy consumption, but much larger:

- ISCC (International Sustainability and Carbon Certification) relates to greenhouse gases emissions, also though the protection of land, forest, water soil and air. It also includes human, labour and land rights.
- Risk assessment, in conjunction with SSbD, allows to turn away from chemicals presenting environmental and human health risks
- Bio based economy requires knowledge about resource depletion and conflict of uses
- Finally, NAMs (non-animal methodologies) also is seen as a necessary transition

This resonates with the ranking in section 2.1.4 where the energy efficiency was not identified as the most relevant green competence. For the respondents, the sustainable transition resonates more with mitigations of health and environmental risks, resources, and respect of humans and non-human’s rights.

<b>Other training courses</b>
Training on risk assessment ongoing. Plans for SSbD
ISCC training
hydrogen in metallurgy
bio based economy electro chemistry
We are running training courses in the use of NAMs which will be part of the green transition

## 4. Generation and Gender Gaps

The survey includes section on gaps. In this run of the survey, the gaps are focused on gaps in digital skills in view of the age and gender.

Generation gap in digital skills	Number of companies
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Yes, but minor gap	10
Yes, significant gap	5

All the companies see a generation gap in digital skills, 9 indicated a minor gap and 5 significant.

Gender-based differences in digital skills	Number of companies
Yes, but minor differences	2
Yes, significant differences	2
No, there are no noticeable differences	11

Mostly the organisation see no noticeable differences in gender-based differences in digital skills. However, some respondents perceive a significant generational gap in digital skills. This highlights that for a significant group, generational differences in digital proficiency are more pronounced and may impact organizational performance.

For organisations where significant gaps are observed, prioritize digital transformation strategies and provide targeted support to reduce disparities. They should encourage knowledge sharing and mentorship programs where digitally skilled younger employees can help train older employees, and vice versa, to balance expertise in digital and traditional work practices. The training programs that address specific generational needs, focusing on upskilling employees with lower digital proficiency to bridge the gap should be implemented.

Regarding the gender gap, the equal access to digital tools, training, and development opportunities should be continued promoting.

## References

Chemskills, 2025. [Report on ChemSkills Survey Results 1 st iteration, generic results](#). Last accessed Mars 2026.