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## GREEN-LOOP

### Sustainable manufacture systems towards novel bio-based materials

#### WP8 – Communication, Dissemination and Training

# D8.10 – GREEN-LOOP directives on gender dimension and non-discrimination

Version 2

#### Document information

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## GREEN-LOOP Consortium Partners

	Partner	Acronym	Country
1	IDENER RESEARCH & DEVELOPMENT	IDE	ES
2	NATIONAL INSTITUTE OF CHEMISTRY	NIC	SI
3	SLOVENIAN NATIONAL BUILDING AND CIVIL E. I.	ZAG	SI
4	FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V	FHF	DE
5	LABRENTA SRL	LBRT	IT
6	MIXCYCLING SRL	MYX	IT
7	NEROSU BIANCO	NSB	IT
8	GERACE MARIA CRISTINA - TERRE DI ZOE'	TDZ	IT
9	IRIS TECHNOLOGY SOLUTIONS, SOCIEDAD LIMITADA	IRIS	ES
10	GLOWNY INSTYTUT GORNICTWA	GIG	PL
11	AACHEN UNIVERISTY: PROCESS CONTROL ENGINEERING / AACHEN UNIVERISTY: INSTITUTE OF SOCIOLOGY	AAU	DE
12	AUSTRIAN STANDARDS INTERNATIONAL	ASI	AT
13	INSTITUTO DE SOLDADURA E QUALIDADE	ISQ	PT
14	AXIA INNOVATION UG	AXIA	DE
15	ASOCIACIÓN DE INVESTIGACIÓN METALÚRGICA DEL NOROESTE	AIMEN	ES
16	NATIONAL COMPOSITE CENTRE	NCC	UK
17	UNIVERSITY OF BRISTOL	UBRIS	UK



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## Executive Summary

This deliverable titled D8.6 – *GREEN-LOOP directives on gender dimension and non-discrimination* is part of Task 8.5 *Gender Dimension*, which is planned to be carried out within the GREEN-LOOP project for its full duration [M01-M36]. AAU has the lead for this task and the responsibility for this task.

Blindness in relation to gender issues generates disproportionate impacts on invisible men and women, and therefore does not allow for the design of mitigation measures when necessary. Considering the ex-ante gender approach will lead to less discriminatory and inclusive projects, creating social justice in contemporary society, as targeted by the Sustainable Development Goals (SDGs) strategy.

Within this framework, this document focuses on the integration of gender and diversity dimensions in the GREEN-LOOP project. The GREEN-LOOP project intends to serve as a flagship model for the treatment and incorporation of gender sensitivity and ethical concerns within the Horizon Europe programme. To this end, the consortium is fully committed and aware of this objective. We are working on an integrated approach to the development of the project throughout its duration.

The specific objectives of this type of action are mainly:

- Foster gender balance in research teams;
- Ensure gender balance in decision-making processes;
- Integrate gender/sex analysis in research and innovation (R&I) projects.

To this end, basic terms are defined in order to contribute to a common understanding and to provide a basis for the following chapters. Followed by recommendations for inclusive language and visualisations. In this context, guidelines for the consortium are provided. Afterwards, a brief overview of the European legislation on gender equality and Gender Equality Plans (GEPs) is given.

Chapter 5 '*Gender and Diversity in R&I*' highlights the importance of including these dimensions in R&I processes. Finally, various measures against gender-based discrimination are presented, leading to a plan for addressing the gender dimension in the GREEN-LOOP project (described in Chapter 6).

Different parts of the project are relevant for the gender dimension of GREEN-LOOP. They are discussed in Chapter 6. In general, the integration of the gender dimension involves the following areas:

- Personal
- Approach
- Training
- Monitoring
- Communication & Dissemination.

Special attention of the gender dimension should be paid to the design of the optimised value chains, the health and safety audits and the life-cycle sustainability assessment (WP2-5).



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## Abbreviations

C&D – Communication and Dissemination

EC – European Commission

ECs – environmental chemicals

EIGE – European Institution for Gender Equality

ERA – European Research Area

EU – European Union

GEP – Gender Equality Plan

H2020 – Horizon 2020, EU funding scheme

HEU – Horizon Europe Programme

ICT – Information and Communication Technologies

R&I – Research and Innovation

STEM – Science, Technology, Engineering and Mathematics

STO – Chair of Sociology of Technology and Organization

WP – Work Package



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## 1. Introduction

The GREEN-LOOP project aims to set an example in the treatment and integration of gender sensitivity and ethical issues within the Horizon Europe programme (HEU). The HEU is the EU's key funding programme for Research & Innovation (R&I). It addresses climate change, contributes to the achievement of the UN's Sustainable Development Goals (SDGs) and boosts the EU's competitiveness and growth. As in the predecessor programmes Horizon 2020, gender is also included as a cross-cutting issue in the HEU. Gender equality is emphasised throughout the whole programme (Art. 2, Art. 6a). The framework explicitly supports projects that take into account gender mainstreaming in R&I at institutional and content level, thereby contributing to an increased excellence and quality in R&I, strengthening innovation capacity and improving competitiveness.

To this end, the consortium is fully committed and informed of the objective, and we are working on an integrated methodology for the project development throughout its duration. This activity will be led by AAU Chair of Sociology of Technology and Organization, which is particularly concerned with the interdependence between technical and organisational innovations and social and cultural innovations. Working in interdisciplinary projects and bringing in our expertise at early stages of socio-technical innovation in order to shape social processes is the underlying mission of our research. As part of the GREEN-LOOP project, AAU will contribute its expertise by integrating social dimensions such as gender and diversity into the design and optimisation process of the three innovative bio-based materials developed during the project lifetime.

The following report is part of WP 8 "Communication, Dissemination and Training" Task 8.5 "Gender Dimension" of the GREEN-LOOP project. The report refers to the integration of the gender dimension and the anti-discrimination strategy during the overall project. The topics of the report will also be part of the gender seminar that will be held in the first semester of the project by AAU.

### 1.1 Purpose of this Document

The purpose of this report is to develop measures to prevent gender inequality and discrimination within the project. By providing the consortium with more profound knowledge on this topic, we can pursue allows the following goals:

- Fostering the gender balance in research teams;
- Ensuring gender balance in decision-making processes;
- Integrating gender/sex analysis in research and innovation (R&I) project;
- Adapting research methodologies to become gender-sensitive.

With the present document, the GREEN-LOOP consortium commits itself to promote gender equality and to integrate the gender dimension in the project from its inception to its final implementation.

For example, specific recommendations for action are mentioned in Chapter 2.4. Moreover, the report focuses primarily on R&I, as this area is of particular importance in the context of the project. Furthermore, several case studies are presented to illustrate the relevance of including the gender dimension at different project stages. The best way to address this section is by examining gaps, biases, or imbalances that exist in the field of research present in the project. This will be specifically conducted in section 6. In this sense, the



GA N°**101057765** D8.10 “GREEN-LOOP directives on gender dimension and non-discrimination” report will identify approaches for incorporating the gender/diversity dimension into the GREEN-LOOP project.



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## 2. Term Definition

### 2.1 Sex and Gender

While sex refers to biological characteristics, the term gender describes socially constructed roles, behaviours, identities, and relationships that structure societies.

In general, the biological sex of humans is divided into male, female and intersex. The different expressions are attributed to the respective composition of chromosomes, which are responsible for forming different phenotypic traits (European Commission 2020).

Gender, in contrast, is understood less as a biological fact and more as socially constructed. The conceptual separation between sex and gender should not obscure the fact that sex and gender are empirically intertwined and influence each other (Villa 2018, Schiebinger et al. 2011-2021a). However, for the purpose of analysis, the separation has proven useful and is hence used for this document of the GREEN-LOOP project.

### 2.2 Intersectionality

The term intersectionality is used to describe a form of discrimination in which several categories (e.g. gender and age) are intertwined and lead to inequality. The concept entered sociology in the late 1980s and early 1990s and was largely coined by Kimberlé Crenshaw (Crenshaw 1989). In her article "Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics", she argued that "single-axis frameworks" are insufficient to capture discrimination against black women. Considering only one category, in this case 'sex' or 'race' is not sufficient to represent Black women's experiences of discrimination, she argued. Instead, it is necessary to include the interlocking of both categories in order to understand black women's discrimination. The intersectional analysis goes beyond the simple summation of the two categories 'sex' and 'race'.

### 2.3 Gender Sensitivity

"Gender sensitivity encompasses the ability (skills, knowledge, and attitudes) to acknowledge and make existing gender differences, issues, and inequalities visible" (Figuroa Vélez/Vélez Ochoa 2021: 632). To be gender sensitive is important because the consideration of the category gender and other intersecting categories in analyses reveals unequal power structures and can thus contribute to more equality. Gender sensitivity needs to be understood as a learning process whose goal it is to develop skills for integrating gender perspectives into everyday life, work life etc. (Leal Filho et al. 2021).

### 2.4 Inclusive Language and Visualisation

#### 2.4.1 Definitions

When inclusive language is used, it is important to choose words, phrases, and sentences that do not exclude or offend anyone. The European Institute for Gender Equality defines inclusive language as follows:

"Realisation of gender equality in written and spoken language is attained when women and men and those who do not conform to the binary gender system are made visible and addressed in language as persons of equal value, dignity, integrity and respect." (EIGE 2016)

While English is not grammatically a gendered language, language is nonetheless infused with meanings and associations that are by no means gender-neutral. Role models, stereotypes, and inequalities are



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GA N°101057765 D8.10 "GREEN-LOOP directives on gender dimension and non-discrimination" incorporated into language and are thereby reproduced.

This effect runs through all languages, although differences in intensity exist. For example, this applies to languages in which gender is ascribed to words by grammar and the generic masculine is predominantly used, even when all genders are meant (as in Spanish or German).

Because the spoken and written language in GREEN-LOOP is preponderant English, language recommendations in this report refer to English. However, when using other languages, equal attention should be paid to inclusive language.

In addition, care must also be taken with any visual representations to ensure that they are inclusive. This means that stereotypes and prejudices should be avoided. Instead, Visualisations should reflect diversity.

#### 2.4.2 Guidelines for Inclusive Language and Visualisations

In the following, recommendations are compiled that are intended to support the implementation of inclusive language and visual representations with focus on gender aspects. The recommendations do not claim to be exhaustive, as this is a summary of the "Toolkit on gender-sensitive communication: a resource for policymakers, legislators, media and anyone else with an interest in making their communication more inclusive" (EIGE 2019) and "Inclusive communication Guidelines" (EU 2019). More detailed descriptions and further examples can be found in the mentioned sources.

Categories of gender-discriminatory language (EIGE 2019):

- **Stereotypes:** assigning gender when gender is unknown or irrelevant as a result of stereotypes.
- **Invisibility and omission:** language which casts the male as the generic norm and keeps women from being visible in public life.
- **Subordination and trivialisation:** language which paints one gender, often women, as inferior or belittles them.

The categories defined by EIGE (2019) can be applied to visual representations as well.

#### Guidelines for Inclusive Language:

- Avoid gendered pronouns (he or she) when the person's gender is unknown. Use "they" instead.
- Avoid irrelevant information about gender. For example, when speaking about occupations often gendered terms are used (policeman/policewoman, *better alternative* police officer).
- Avoid gendered stereotypes as descriptive terms ('ladylike handshake', 'to man up').
- Avoid gendering inanimate objects. Instead, use the pronoun 'it' to talk about inanimate objects.
- Avoid using adjectives with gender connotations, e. g. 'bossy' or 'ambitious'. Sometimes different adjectives are used to describe the same features in women and men.
- Do not use 'man' or 'he'/'his' as the neutral term (e. g. 'mankind', *better alternative* 'humankind').
- Do not use gender-biased nouns to refer to a group of people (e. g. 'guys' or 'dudes', 'colleagues', 'team', etc.).
- Write in a way that makes it clear whether you mean only women, only men, or all genders.
- Explicitly name women, men or non-binary people when you really mean only them (it is important to remember that you cannot always be sure how people identify themselves in terms of gender)



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- Use gender-neutral language (e.g. "Dear team", "Dear audience", etc.).

#### Guidelines for Inclusive Visualisations:

- Choose images of people that are diverse in terms of gender, disability, age and ethnicity, ensuring specific groups feel visually represented.
- Avoid using an image showing only women or only men if the group addressed or referred to is mixed.
- Show women and men, and people of different origins in roles and functions of equal value.
- Challenge gender stereotypes/role models in images. This could mean choosing a woman to illustrate a topic traditionally considered male, e.g. technology or science. Inversely, choose a man to illustrate a subject traditionally considered female, e.g. family care, human resources management, household related tasks, etc.
- Challenge traditional definitions of femininity, such as submissiveness or sentimentally expressed through clothing, cosmetics, style, etc.
- Avoid using colours as shorthand for gender, such as pink for women and blue for men.

A more general checklist for using inclusive language and visualisations is provided on the Gendered Innovations website and may be useful in cases where none of the above guidelines apply. In addition, the checklist includes questions that can be used to identify potential bias.

Checklist after Schiebinger et al (2011-2021e):

- How might metaphors be gendered and create unintended hypotheses?
- Do gendered metaphors reinforce stereotypes?
- Are word choices or naming practices gendered?
- Do naming practices or pronoun choices exclude gender-diverse individuals?
- How does nomenclature influence who becomes a scientist or engineer?
- Are the language and images being used gender inclusive?
- Are graphs, charts, or images used to visualise abstract concepts gendered in unintended ways?
- Does a particular field of science or engineering promote a self-image that carries messages about the "gender appropriateness" of participation by women, men, and gender-diverse people?
- Are problem sets or training exercises chosen to illustrate basic scientific principles gendered in unintended ways?

The consortium is committed to using inclusive language in all communication activities (via email, during meetings and informal conversations) and in the reports and deliverables.



### 3. European Legislation on Gender Equality

Gender Equality is one of the fundamental values of the EU and was first regained in 1957 in "the principle of equal pay for equal work". Since then, gender equality has encompassed various EU directives, regulations as well as support measures and funding programs. Basically, gender equality is enshrined in the "Charter of Fundamental Rights of the European Union" in Title III "Equality" Article 21 "Non-discrimination" and Article 23 "Equality between women and men".

Thus it says:

Any discrimination based on any ground such as sex, race, colour, ethnic or social origin, genetic features, language, religion or belief, political or any other opinion, membership of a national minority, property, birth, disability, age or sexual orientation shall be prohibited" (Art. 21, para. 1, EU Charta).

Equality between women and men must be ensured in all areas, including employment, work and pay. The principle of equality shall not prevent the maintenance or adoption of measures providing for specific advantages in favour of the under-represented sex (Art. 23, EU Charta).

In addition, the EU is promoting an effective gender equality policy in the sense of "gender mainstreaming". Gender mainstreaming means that the gender perspective is included "into the preparation, design, implementation, monitoring and evaluation of policies, regulatory and spending programs" (EIGE 2022). The approach of gender mainstreaming is legally reflected in the Treaty of Lisbon (Art. 8 AEUV). The EU Commission is responsible for implementing the gender mainstreaming approach within a multiyear strategic plan (Gender Equality Strategy 2020-2025). The key objectives for an equal Europe within the Strategy are "ending gender-based violence; challenging gender stereotypes; closing gender gaps in the labour market; achieving equal participation across different sectors of the economy; addressing the gender pay and pension gaps; closing the gender care gap and achieving gender balance in decision making and politics" (European Commission 2020).

The Gender Equality Index serves as an orientation for the implementation and progress of gender equality within the EU and its member states. The index comprises various indicators from the core areas of work, money, education, time, power and health. In addition, the index includes violence against women and intersectional inequalities (EIGE 2023). According to the latest report on the Gender Equality Index, a little progress was recorded compared to previous years. This can be attributed to the positive developments in the domain of power, which at the same time shows the greatest inequalities. Otherwise, according to EIGE, there would have been a decrease of the Index score due to the impact of the corona pandemic (Barbieri et al. 2022).



## 4. The Gender Equality Plan in Research and Innovation Organizations

To receive EU funding under the Horizon 2020 programme (H2020), public bodies, research organisations, and higher education institutions are obligated to have a Gender Equality Plan (GEP) in place. A GEP is defined as "a set of commitments and actions that aim to promote gender equality in an organisation through a process of structural change" (European Commission 2021a). Implementing GEPs in Research and Innovation Organizations is intended to cause an institutional transformation that aims to support the goals of gender equality in R&I.

According to the European Commission (EC) (2021a), GEPs should meet four mandatory requirements:

1. **Public document:** The GEP must be a formal document published on the institution's website, signed by the top management and actively communicated within the institution. It should demonstrate a commitment to gender equality, set clear goals and detailed actions and measures to achieve them.
2. **Dedicated resources:** a GEP must have dedicated resources and expertise in gender equality to implement the plan. Organisations should consider what type and volume of resources are required to support an ongoing process of sustainable organisational change.
3. **Data collection and monitoring:** organisations must collect sex/gender disaggregated data on personnel (and students, for the establishments concerned) with annual reporting based on indicators. Organisations should consider how to select the most relevant indicators, how to collect and analyse the data, including resources to do so, and should ensure that data is published and monitored on an annual basis. This data should inform the GEP's objectives and targets, indicators, and ongoing evaluation of progress.
4. **Training:** The GEP must also include awareness-raising and training actions on gender equality. These activities should engage the whole organisation and be an evidence-based, ongoing and long-term process. Activities should cover unconscious gender biases training aimed at staff and decision-makers and can also include communication activities and gender equality training that focuses on specific topics or addresses specific groups.

Besides, five content-related areas are recommended by the EC (2021a) to be integrated into the Plan:

1. **Work-life balance and organisational culture:** GEPs aim to promote gender equality through the sustainable transformation of organisational culture. Organisations should implement necessary policies to ensure an open and inclusive working environment, the visibility of women in the organisation and externally, and that the contribution of women is properly valued. Inclusive work-life balance policies and practices can also be considered in a GEP, including parental leave policies, flexible working time arrangements and support for caring responsibilities.
2. **Gender balance in leadership and decision-making:** Increasing the number and share of women in leadership and decision-making positions touches upon all aspects in the GEP. Measures to ensure that women can take on and stay in leadership positions can include providing decision-makers with targeted gender training, adapting processes for selection and appointment of staff on committees, ensuring gender balance through gender quotas, and making committee membership more transparent.



3. **Gender equality in recruitment and career progression:** Critically reviewing selection procedures and remedying any biases can ensure that women and men get equal chances to develop and advance their careers. Establishing recruitment codes of conduct, involving gender equality officers in recruitment and promotion committees, proactively identifying women in underrepresented fields and considering organisation-wide workload planning models can be important measures to consider in a GEP.
4. **Integration of the gender dimension into research and teaching content:** The GEP should consider how sex and gender analysis will be included in the research or educational outputs of an organisation. It can set out the 'organisation's commitment to incorporating sex and gender in its research priorities, the processes for ensuring that the gender dimension is considered in research and teaching, and the support and capacity provided for researchers to develop methodologies that incorporate sex and gender analysis. Research funding and research performing organisations both have a role to play in ensuring this.
5. **Measures against gender-based violence, including sexual harassment:** Organisations establishing a GEP should consider taking steps to ensure they have clear institutional policies on sexual harassment and other forms of gender-based violence. Policies should establish and codify the expected behavior of employees, outline how members of the organisation can report instances of gender-based violence and how any such instances will be investigated and sanctions applied. They should also consider how information and support is provided to victims or witnesses and how the whole organisation can be mobilised to establish a culture of zero tolerance toward sexual harassment and violence.

It should be added that sexism comes in many different forms. Some of these are more visible and others may be more covert and are therefore harder to recognise. It is important to address all forms of sexism within a GEP in order to achieve gender equality.

Further information about the requirements of GEPs can be found in the EC's document (2021a) "Horizon Europe guidance on gender equality plans".

The following GREEN-LOOP consortium partners already have a GEP in place:

- IDENER
- NIC
- UBRIS
- FHF
- IRIS
- AAU
- ASI
- ISQ
- AIMEN



**4.1 Importance of Gender Equality Plans**

As already mentioned in chapter 3, gender equality is one of the fundamental values of the EU. This also includes that R&I organisations contribute to the implementation of gender equality by means of a GEP. Besides, more gender equality leads to an increase in the quality of research and to an improvement of innovation capacity. This shows the positive correlation between the presence of a GEP and the innovation potential of member states. In addition, gender equality contributes to a more pleasant working environment, which also leads to greater research quality and makes the workplace more attractive (European Commission 2021a).



## 5. Gender and Diversity in R&I

In order to promote further gender equality in the EU Member States, the EC has made the integration of gender into R&I a priority in the H2020 programm. "Horizon 2020 was the first framework program to set gender as a cross-cutting issue, with one of the underpinning objectives being to integrate the gender dimension into research and innovation content" (European Commission n.d.) The successor programme HEU will continue this (Art 2, Art 6a).

On the one hand, this involves creating a gender balance and, on the other hand, taking the gender dimension into account in R&I content. While gender balance refers, for example, to the composition of the research teams involved in the project, gender dimension means the inclusion of gender and sex differences in the research content of the project (European Research Executive Agency 2022). In the context of gender in R&I, an inclusive approach is taken to consider the intersection of multiple social categories (e. g. ethnicity, age, disability etc.) causing specific forms of discrimination (European Commission 2022).

More detailed information as well as methodological tools for sex, gender and intersectional analysis, can be found in the policy review "Gendered Innovations 2" from the EU-funded H2020 expert group (European Commission 2020).

In addition, gender equality and gender mainstreaming is one of the top five priorities of the European Research Area (ERA) Agenda (European Commission 2021b: 8).

The state of gender equality is reviewed regularly and documented in the "She Figures" reports. The report states that the number of female Doctoral graduates has improved to 48.1% at the European level and can thus be considered balanced. However, female Doctoral graduates are still underrepresented in the fields of Information and Communication Technologies (ICT) and Engineering, Manufacturing and Construction. Small progress could be achieved in the Science, Technology, Engineering and Mathematics (STEM) field but overall, there is still a gender imbalance. Women are also severely underrepresented in technology-oriented fields in the labour market.

At European level, about one-third of employees in science are women. In spite, there continues to be horizontal segregation in scientific careers across the main economic sectors (higher education, government and business) as well as an under-representation of women in senior academic and decision-making positions. Besides, the report presents data about the gender differences in R&I outputs (European Commission 2021c).

Addressing these inequalities will be the future task of the EU and its member states. For this the EU applies an "approach to foster and support gender equality in all aspects of R&I in the EU" (European Commission n.d.).

### a. Importance and benefits of Gender and Diversity in R&I

Incorporating gender and sex into R&I is not only important because of its legal entrenchment but also brings benefits for the EU, the member states and the European citizens. The integration of gender and sex leads to improved quality in research and promotes creativity. More diverse teams also bring more diverse perspectives into research, which in turn makes research more versatile and allows new ideas to emerge and



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GA N°101057765 D8.10 "GREEN-LOOP directives on gender dimension and non-discrimination" thus fosters innovation (Wroblewski 2020). This helps to ensure that Europe remains competitive in a global context. Considering gender and sex in R&I also creates an important contribution to gender equality "by ensuring that findings, products and programs apply to all citizens and society as a whole" (European Commission 2020: 36).

Benefits of addressing the gender dimension in R&I (Europe Media Trainings n. d., European Commission 2020):

- Improving the scientific quality and societal relevance of the produced knowledge, technology, and innovation;
- Upgrading the rigour, reproducibility, and generalizability of science;
- Increasing the knowledge base that will have a societal value;
- Fostering the innovation potential;
- Ensuring that EU remains competitive in a global context;
- Closing gender gaps and fully exploiting talents;
- Contributing to more gender equality in general and specifically in scientific careers.

#### b. Case Studies

In the following, three case studies are presented as examples to illustrate the importance of including sex and gender in R&I and the consequences of not including diverse perspectives.

The design of crash-test dummies is a good illustration of the effects that can result from using the average male body as the standard. The first crash test dummies were based exclusively on the average male body type. For this reason, all people who did not conform to this average (e. g., women, elderly, obese people, or children) were at higher risk of being seriously injured or to die during a car accident. Even when female dummies were first introduced in the early 1960s, they were not based on an average female body, but were developed simply as a deviation from the male standard. Accordingly, the risks for women of being badly injured or dying in a car accident are still higher than the risks for men.

In addition, a car's ergonomic features can lead to higher risks for certain groups of people. For example, conventional 3-point seat belts do not protect pregnant women and their unborn child properly in the event of a car crash and "are the leading cause of fetal death related to maternal trauma" (Schiebinger et al. 2011-2021b). Another example is the design of car seats and possible settings. Women often sit closer to the steering wheel due to their average smaller stature, which puts them at a higher risk of suffering internal injuries in frontal collisions compared to men<sup>1</sup>.

This case study demonstrates the importance of including sex and gender in research, development and design. Even though progress has been made over the last decades in the field of crash dummies, inclusive dummies "are still not the standard or required in automobile safety tests" (Schiebinger et al. 2011-2021b).

Research into the potential effects of environmental chemicals (ECs) on the human reproductive system has also been predominantly studied in males. However, research examining the effects of ECs on women shows

<sup>1</sup> This also applies, for example, to smaller men.



GA N°101057765 D8.10 "GREEN-LOOP directives on gender dimension and non-discrimination" that the effects of such chemicals may differ between men and women. This is related to both biological (e.g., body size, body fat percentage, endocrine system, etc.) and social factors (e.g., gender division of labour, income, etc.). In addition to gender, the different life stages that people go through must also be taken into account.

For example, ECs may have different effects on pregnant women than on non-pregnant women. On the one hand, ECs can have critical effects on the unborn child; on the other hand, the hormonal balance of a pregnant woman differs significantly from that of a non-pregnant woman or man. Similarly, the effects of ECs may be different in children, who are more likely to put their hands in their mouths or play close to the floor, whereas airborne ECs are more likely to collect. In addition, other variables and their intersections must be included in the risk assessment of ECs. Studies suggest that both socio-economic (e.g., household income) and geographic characteristics (e.g., place of residence) may lead to differential exposure (Schiebinger et al. 2011-2021c/ Hausmann 2019).

Another example can be illustrated using AI. AI is one of the technologies that already plays an immense role in our society and is very likely to become even more critical in the future. At the same time, the algorithms that feed AI are by no means neutral or unbiased.

Schiebinger et al. (2011-2021f) list several examples of gender bias. The search engine Google provides two examples of gender bias. Men receive five times more ads for high-paying executive jobs than women. As a second example, the authors mention the gender bias of google translate. Male pronouns are used more often in translations, even when the original text refers to a woman.

### c. Measures against Gender-based Discrimination in R&I

Measures against gender-based discrimination in R&I can include different elements and strategies. The following measures are based on the recommendations of the Gendered Innovations Website (Schiebinger et al. 2011-2021) and the Gendered Innovations 2 Report (European Commission 2020). As mentioned in chapter 2.1 the separation for analytical purposes is very useful, but in empiricism, sex and gender interact and influence each other. Therefore, they cannot always be distinguished so clearly. As a consequence, physical needs and social needs should be analysed as a combination (Schiebinger et al. 2011-2021a).

Moreover, when using standards or reference models in R&I it is important that they are inclusive and reflect social diversity. Asking who is the target audience, might help to be more inclusive.

Also, being aware of stereotypes and other gender-biased thought patterns so that they can be avoided is an important measure. To achieve this, self-reflection and group reflection is a useful strategy.

Furthermore, not being gender- and sex-blind but also not to over-emphasise gender and sex differences because otherwise "significant commonalities or other critical, intersecting variables" could be overlooked (Schiebinger et al 2011-2021d).

Besides, diverse teams with diverse expertise can contribute to the integration of gender and diversity. In addition, care should be taken in the use of language and visualisations to ensure that they are inclusive during all phases of the research. The guidelines in Chapter 2.4.1 can be of help.



A good overlook for integrating the gender dimension into R&I can be drawn from the below figure about engineering processes:

Last mentioned, having a GEP in place is an excellent instrument to avoid institutional discrimination and create a pleasant working culture.

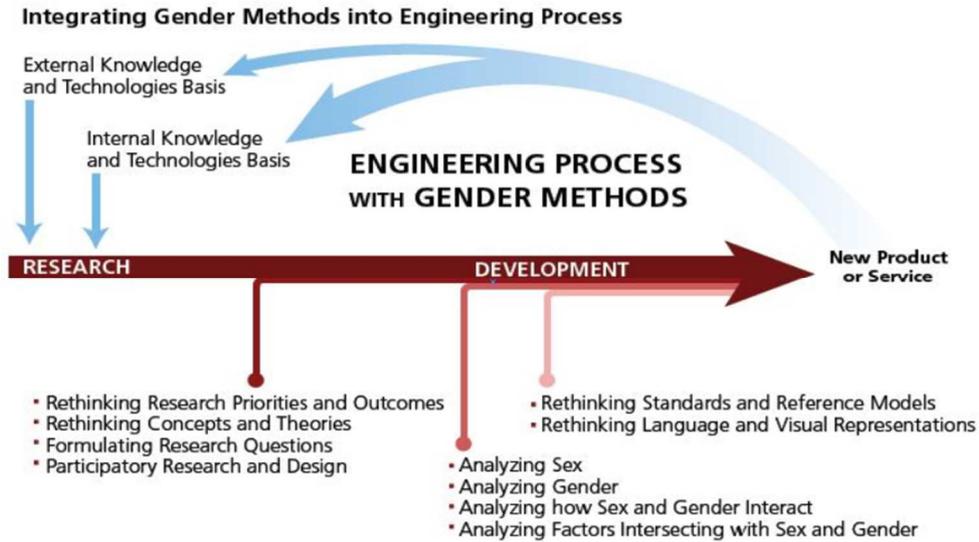


Figure 1: Integrating Gender Methods into Engineering process (Schiebinger et al. 2011-2021c)



## 6. Approaching Gender Dimension in GREEN-LOOP

GREEN-LOOP consortium is committed to promoting the participation and leadership of women at all levels. During the project period [M1-M36], the following strategies can be implemented to integrate the gender and diversity dimension into the different activities of GREEN-LOOP.

**Personal:** The consortium will follow the Directive 2002/73/EC on the implementation of equal treatment for men and women as a guideline for, e.g., access to employment, vocational training and promotion, and working conditions. Furthermore, equal opportunities will be targeted when hiring new researchers and when scheduling speakers at project-related events. Equal opportunities will be targeted when hiring new researchers and when scheduling speakers at project-related events.

In addition, participation in various conferences and the publication of scientific articles are planned as part of the Communication and Dissemination Plan. In this context, the consortium should also pay attention to gender balance in terms of an equal participation of women and men.

Moreover, women are presented in steering positions, with 3 WPs lead by females and an average women percentage of 27% in the project staff. The execution key personnel of all project partners show a good mix of men and women, even more remarkable, since many scientific and technical fields addressed in the project (such as engineering and IT) used to have a low percentage of female students and researchers.

**Approach:** With regard to gender equality and diversity, an inclusive and interdisciplinary approach will be taken. An inclusive approach is important in order to address the intersection of different social categories and the potential discrimination that may arise from this intersection. Consequently, gender and other social categories, like age, ethnicity or socio-economic status, should not be analysed separately. The needs of end-users and other target groups can be better addressed, by analysing multiple categories and their interactions. The Consortium will ensure that, other possible relevant social categories, in addition to gender, are considered when analysing data with a social dimension. An intersectional approach contributes to the EU's gender equality goals SDGs, by increasing the acceptance and usability of energy-efficient products and services as well as driving the circular transition.

An interdisciplinary approach is taken by working in teams with a different scientific background and combining the diverse expertise of each discipline and integrating it in the project's work.

**Training:** To avoid any potential gender biases within the project in general, AAU hosted an internal workshop [03.02.2023] on *How to integrate the Gender Dimension in R&I*. The contents of the workshop can be found in the agenda below.



Time	Topic
09.00-09.10	Welcome & Introduction
09.10-09.20	Basics on Gender and Diversity in R&I
09.20-09.40	Breakout Session (groups): Gender and Sex related Challenges in R&I
09.40-10.05	Joint Discussion & Summary in plenary
10.05-10.15	Break
10.15-10.20 10.20-10.25	Board Session: Inclusive Language/Visualizations Summary
10.25-10.30	Board Session: Approaching Gender Dimension in GREEN-LOOP
10.30-10.50	Joint Discussion & Summary in plenary
10.50-11.00	Wrap-up and Questions/Feedback

Figure 2: Agenda of the internal workshop hosted by AAU

The workshop was based on the following learning objectives:

- Provide an overview of the basic terms and EU policies on gender equality
- Understanding the gender-related problems in the R&I area
- Raise awareness of the importance of including sex and gender dimension into R&I
- Collecting ideas on how to integrate the gender dimension in the GREEN-LOOP project

The following results emerged from the workshop:

- There is still horizontal and vertical segregation in the EU especially in the STEM fields
  - reasons suggested by the consortium:
    - care work is still mainly done by women;
    - institutional structures do not adequately promote women's careers (in line with the gender division of labour);
    - lack of role models (higher degrees in academic careers in the STEM fields are male-dominated, might influencing women's choices)



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- Gender bias in search engines:
  - 'Scientist' is more associated as male
  - Example for the gender data gap → women in science are less popular than men; men get more credit for their scientific work; while women often remain invisible (Matilda effect)
  - Historically: women were not allowed to visit universities
- Crash test dummies case study:
  - Crash test dummies are based on the norm of an average-sized male body, but many body types do not fit this norm
  - all people who do not conform to this average (e. g., women, elderly, obese people, or children) are at higher risk of being seriously injured or to die during a car accident
  - traditional 3-point-seatbelt can be harmful to a fetus during a car accident
- Unconscious bias:
  - person's tendency to make judgments based upon social stereotypes
  - leads to favouring some people/ideas over others, thus limiting the potential for innovation
  - it is important to reflect on these stereotypes because it forms the way we think, see things and how we decide → leads to discrimination and reproduces stereotypes
  - instead slowing down decision processes and re-examine results, try reflecting on your own biases, having multidisciplinary and multicultural teams

Throughout the project, the methodology proposed by GREEN-LOOP will develop internal seminars to raise awareness of the importance of this issue within the consortium and provide knowledge and tools to integrate it into the activities developed during the implementation.

**Monitoring:** AAU (STO) is responsible for monitoring and fostering gender balance during the overall project and, in particular, while developing the GREEN-LOOP platform for social engagement and training [T2.5, T8.3]. The gender dimension should also be integrated into the design of the optimised value chains, the health and safety audits and in the life-cycle sustainability assessment. Therefore, AAU (STO) participates in the regular (web) meetings of the project, reviews the project reports and can be consulted for advice from the consortium.

- GREEN-LOOP Platform development (WP2):

Following the EC policy review of Gendered Innovations 2: ‘How Inclusive Analysis Contributes to Research and Innovation’ (European Commission 2020), GREEN-LOOP will consider two main aspects when implementing digital and smart tools for manufacture (WP2 to WP5).

- Designing optimised value chains tools that integrate gender perspectives, leading to environmental and circular economic solutions that can drive the bio-based transition by adopting novel manufacturing technologies.
- Driving the circular transition by taking an intersectional approach to gender, age and socioeconomic factors. Bio-based materials companies, policymakers, and researchers need to understand better gender and other social, economic, and demographic factors.



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- Business models customised to be oriented for a variety of target audiences and stakeholders, especially in the bio-chemical, materials, manufacturing sectors and digital platforms.

Furthermore, the aim is to create an inclusive user-interface. Therefore, the user-interface should be tested during the development phase, taking into account gender and diversity aspects. This can be done in the context of an assessment carried out by AAU (STO) or through a survey.

- Bio-value chains manufacturing (WP3-WP6)

As already mentioned in Chapter 5, Section b, the effects of ECs may differ with respect to sex and gender aspects (Schiebinger et al. 2011-2021c/ Hausmann 2019). For this reason, potential hazards of materials, compounds or residues should be examined according to sex and gender differences and other intersecting social categories like age or occupation.

In general, safety and health issues should be analysed among sex and gender differences. Asking which groups are affected by potential hazards, contaminants and safety measures.

In terms of occupational safety, potential hazards arising from the use of microwave and ultra-sound technologies should also be considered from a sex and gender perspective. Studies suggest that these technologies can be particularly dangerous for pregnant women (Environmental Health Trust 2020, Doudou et al. 2021). Pregnant women are a particularly vulnerable group and should therefore be given appropriate safety precautions. Further testing should be carried out if it appears that other groups are likely to be affected.

Sex and gender should also be considered in the adequate use of personal protection equipment. Personal protection equipment should not be based on the average male as the standard, ignoring the diversity of body types (cf. Schiebinger et al. 2011-2021b). When using personal protection equipment, care must be taken to ensure that no social group is disadvantaged or discriminated against.

Ergonomics of components in the design stages should be analysed regarding sex and gender dimensions. For example, bottle closures should be designed in such a way that they do not discriminate against any social group by being designed to fit only the average size of male hands.

AAU will be in charge of the verification that all relevant aspects have been taken into account in the health and safety issues mentioned above.

- Sustainability assessment (WP2)

In this sense, the life-cycle sustainability assessment (WP2) will disaggregate results by sex, when relevant, in determining response to climate change or other sustainability indicators. But the social LCA should not only disaggregate results by sex, but also consider other potentially relevant social categories such as gender, age, socio-economic status or geographic location etc.



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Analysing gender and the intersection of different categories contributes to a better understanding of climate impacts and responses to mitigation measures. Disaggregating data only by sex is not enough to fully understand climate impacts. Instead, researchers should "compare different groups of women and men based on social factors that also predict climate footprint " (Schiebinger et al. 2011-2021g). For example, various calculations and research results indicate that the interaction of gender and socio-economic status has an impact on the climate footprint (ibid.).

Take into account how gender norms may have an impact on the implementation of technical solutions as well as how technical solutions may have an impact on gender norms (European Commission 2020: 25). It may also be relevant for the LCA to consider gender aspects of waste management (ibid.: 27).

**Communication & Dissemination:** Diversity factors (age, sex, gender, ethnicity) also play a significant role in Exploitation, Dissemination and Communication plans (WP7, WP8), to fulfil stakeholders' and end-users' expectations.

A language ensuring inclusion, social diversity and visualisations will be used in all communication and dissemination activities.

Before any communication and dissemination activities, the targeted audiences will be analysed in order to check if the planned language to be used will be proper to them. If the audience is a group and the communication and the dissemination language is English, sex won't probably be noted from readers, even if it could be useful to highlight female and male after the group type name (e.g. researchers – males and females-).

If the communication and the dissemination language is not English, sex will sometimes be highlighted: e.g. if a group is made of males and females who are researchers, the communication message will probably include different words to mention male researchers on the one side and female researchers on the other side.

It is also relevant to include the following words in the communication and in the dissemination messages, when addressing the targeted audience: "with no barrier", "without any distinction", "open to the world", "with no difference regarding age", "multi-attracting", "inclusive opportunity", "open door context".

If the targeted audience is referred to individual person for which the name and the title is known, it would be useful to address the communication and the dissemination message by highlighting title and name to make know the importance of the role of each individual person in the foreseen activity.

In case of participation in international conferences and fairs, it is important to avoid to give speeches addressed only to recipients coming from one country or from one geographical area; it is relevant to address to people from multiple countries, with no barrier.



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## 7. Conclusions

This document is the basis for the integration of the gender and diversity dimension of the GREEN-LOOP project. The report serves as a knowledge base for gender and diversity in R&I and complements the content of the workshop. It also includes guidelines on inclusive language and on visualisation, which are of particular importance for the C&D activities and intern communication to create a respectful work atmosphere. Furthermore, the report provides strategies for the integration of the gender dimension in GREEN-LOOP, which can be further developed beyond this report.

The main points of this report can be summarized as follows:

- Gender Equality is one of the fundamental values of the EU.
- To further promote gender equality in the EU Member States, the EC has made the integration of gender into R&I a priority in the HEU, which will also contribute to achieving the SDGs.
- Addressing the gender dimension in R&I has several benefits for the European economic area, the European scientific area and the European citizens.
- For analytical purposes, it makes sense to separate sex and gender but empirically they interact.
- Only analysing sex/gender without considering the intersection of other social categories can lead to (the reproduction of) stereotypes, false correlations or making social groups invisible. In order to prevent this, GREEN-LOOP takes an inclusive approach.

Chapter 6 showed how the gender and diversity dimension can be addressed in the GREEN-LOOP project. To this end, certain areas have been identified where the gender dimension should be taken into account. The areas have been divided up as follows:

- Personal
- Approach
- Training
- Monitoring
- Communication & Dissemination.

For each section, a strategy was developed on how to integrate the gender and diversity dimension and in which parts of the project special attention should be paid to these dimensions. In particular, the gender dimension should be considered in the design of the optimised value chains, in health and safety audits and in the life-cycle sustainability assessment (WP2-5) For that AAU will be in charge of the verification that all relevant aspects have been taken into account in all the areas mentioned above. The consortium is fully committed and informed of the objective, and is working on an integrated methodology for the project development throughout its duration.

Next steps to contribute to the achievement of this objective could be new seminars to solidify the learning objectives from the first workshop. This could be planned as a more open exchange discussing concerns, problems, questions and all other gender-related issues.

In addition, AAU will continue its monitoring activities and can be consulted on all gender and diversity issues.



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