

European Golf

Safe, responsible and sustainable management of turfgrass

TURFGRASS SUSTAINABILITY ROADMAP 2025 - 2030

Consultative final draft
May 2025

EGA European Golf Association

IN CONSULTATION WITH GEO Foundation for Sustainable Golf

SUPPORTED BY R&A, IGF International Golf Federation, FEGGA Federation of European Golf Greenkeepers Associations, European Tour Group, LET

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Cover photo – Troia Golf, Portugal
Recognised for leadership in sustainable golf

PART ONE

About this roadmap

1.1 Executive summary

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Venice Open at Golf Della Montecchia, Italy
Recognised for leadership in sustainable golf

1.1 Executive Summary

Golf delivers significant 'net positive' benefits to Europe's society, economy and environment, contributing to people's quality of life and their local landscapes across a diverse range of rural and urban locations.

It is a broad sports and land management sector comprising:

- almost 9,000 natural and semi natural golf greenspaces
- almost 5 million participants from an increasingly representative cross-section of society
- a valued and valuable tourism sector, particularly in key regions
- powerful visibility, reach and influence through event, athletes and media
- significant supply chains in machinery, equipment, apparel, catering, seed, turf and other horticultural materials.

Golf is also proactive in sustainability, undertaking a range of specific applied research into all aspects of nature, resources, climate and community, with knowledge feeding into a range of initiatives and solutions including education, standards, programs, metrics, assurance and certification.

While focused on the management of turfgrass, this Roadmap also demonstrates this wider commitment to sustainability and climate action.

The Roadmap emphasises golf's desire to maintain small and yet highly important areas of fine turfgrass in a safe, responsible and sustainable way, these being the playing surfaces upon which the sport depends.

Building on the last decades of chemical reduction, this Roadmap drives further, ensuring all management decisions are based on the principles and practices of Integrated Turf Management, and tracked accordingly.

This collaborative Roadmap aims to complement, and should be read in conjunction with, other Impact Assessments and regulatory positions presented by the European golf sector.

European Golf's Turfgrass Sustainability Roadmap

AMBITION

To be a leader in sustainable sport while growing the game of golf in Europe

VISION

To deliver long-term playability while ensuring a high level of human and environmental protection

GOALS

- Safeguard the future of golf
- Safeguard human health
- Minimise the environmental impact and enhance the environmental benefits of golf

TARGET

To minimise chemical pesticide use

1.2 Introduction

This Roadmap presents a voluntary, sector specific approach towards the safe, responsible and sustainable management of golf turfgrass, that delivers on the stated human safety and environmental protection priorities of the European Union.

It has been produced collaboratively by diverse stakeholders across the European Golf sector, and prepared by expertise in golf, agronomy, environmental protection, human health and sustainability.

THE ROADMAP AIMS TO DEMONSTRATE HOW COMMITTED THIS SPORT AND SECTOR IS, AS WELL AS SET OUT A PLAN OF ACTION FOR VOLUNTARY AND CO-REGULATORY INITIATIVES, THAT WILL BE TRACKED, MONITORED AND REPORTED OVER THE COMING YEARS.

It should be read in conjunction with other resources including the European Turfgrass Sports' Impact Assessment, which helps demonstrate the fundamental importance of these playing surfaces to the wide range of economic, social and environmental benefits that golf delivers to people, communities, businesses and landscapes across Europe.

EGA
European Golf Association

IN CONSULTATION WITH

GEO Foundation for Sustainable Golf

SUPPORTED BY

R&A

IGF
INTERNATIONAL GOLF FEDERATION

FEGGA
FEDERATION OF EUROPEAN GOLF GREENKEEPERS ASSOCIATIONS

EUROPEAN TOUR GROUP

LET

About golf

It is a broad sector that simultaneously:

- Protects and maintains greenspaces for people and nature
- Provides skilled employment (particularly important in rural communities)
- Provides health enhancing physical activity for millions of citizens
- Generates significant regional touristic value
- Delivers major sporting events spectated by hundreds of millions of people globally, including under the European flag
- Supports diverse, often technologically advanced supply chains

In addition, golf places elite athletes in nature, with the ability to reach and influence millions of followers, helping drive sustainable behaviour change across society.

GOLF IS A SIGNIFICANT CONTRIBUTOR TO EUROPE'S SOCIAL, ECONOMIC AND ENVIRONMENTAL WELLBEING.



EUROPEAN GOLF IN NUMBERS

Players
Over **4.7 million** active players within the EU

Courses
Over **8,978** stable greenspaces and integrated landscapes

Events
Over **40** world leading professional sports events and thousands of amateur competitions

Employment
The industry supports close to 400,000 **jobs** and pays almost EUR 9.4 billion in **wages**

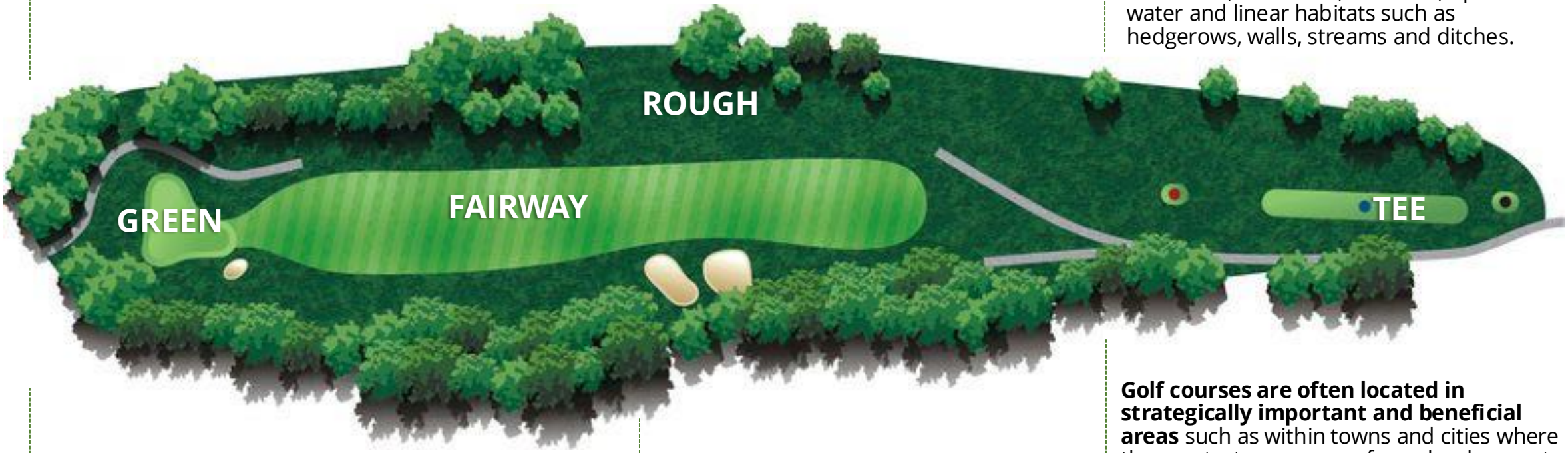
Tourism
Golf and estimated tourism for Spain and Portugal is estimated at **30.49 billion euro** annually

Supply chain
Machinery, equipment, apparel, catering, seed, turf and other horticultural materials

About golf courses

The average European golfing landscape is between **40 and 70 hectares**.

Of this, **around 60%** is natural or semi natural 'out of play' habitat – typically native vegetation comprising various types of grassland, scrub, dwarf shrub and heathland, woodland, wetlands, open water and linear habitats such as hedgerows, walls, streams and ditches.



The playing areas for fair competition, **on average 17 to 25 hectares**, comprises (in order of scale of management) fairways, rough, tees and greens. With greens, at around 1 hectares per course, being the smallest and most intensively managed patches of playing surfaces.

Across Europe the estimated total area of golfing landscape is **over ½ million hectares**, of which **approximately 300,000 ha** is native habitat, and around **2,000 hectares** is putting greens.

Golf courses are often located in strategically important and beneficial areas such as within towns and cities where they protect greenspace from development; in suburban and peri-urban fringes; in greenbelts; along sensitive coastal strips; amongst intensive agricultural landscapes; and as useful buffers around ecological hot spots such as nature reserves, forests and other protected biotopes.

1.3 Purpose

This Roadmap emphasises golf's desire to maintain relatively small and yet highly important areas of fine turfgrass in a safe, responsible, and sustainable way, these being the playing surfaces upon which the sport depends.

At its heart, the Roadmap is designed to build on meaningful progress made and trends to date to help drive the ongoing transition towards:

1. *overall reductions in use of highly targeted plant protection products*
2. *a corresponding continued increase in non-chemical management approaches aligned to the latest and most robust interpretations of Integrated Turf and Pest Management in the amenity sector.*

In conjunction with this roadmap, golf is aiming to provide a framework for golf to protect and restore nature rich landscapes that are utilised by a range of people, and which strengthen and support sustainable communities, while driving the efficient use of natural resources such as water, energy and raw materials, reducing waste and pollution and corresponding carbon emissions.

ROADMAP POSITIVE IMPACT IN GOLF

This Roadmap will focus efforts and actions across European golf, strengthening:

1. **COHESION** – adding coordination of outlook and action across European golf and into EU Member States
2. **CLARITY** - setting out clearly the industry's own goals, expectations, actions, timelines, and targets
3. **EFFECTIVENESS** – providing a transparent framework for golf across Europe to demonstrate progress in delivery against stated targets
4. **CONSISTENCY** - creating a model which can also be applied to other sustainability themes including water, materials, biodiversity and climate action
5. **INFLUENCE** – providing a focus for co-regulatory discussions and acting as a leadership examples for golf globally, and for other sports and amenity sectors

Position

This table shows the orientation and positioning of the Roadmap alongside other activities being undertaken by European Golf in relation to the sustainable use of plant protection products. This highlights how the Roadmap is a critical strategic piece that builds off the Impact Assessment, is aligned with the short-term position statement on regulation of pesticides, and which also provides a consistent framework for implementation across Member States.



1.4 Sustainable Turfgrass – Ambition, Vision and Goals

AMBITION

Our Ambition for Sustainable Golf

To be a leader in sustainable sport while growing the game of golf in Europe

VISION

Our Vision for Sustainable Turfgrass and Golf

To deliver long-term playability while ensuring a high level of human and environmental protection

Safeguard the future of golf

Safeguard human health for our staff, players and the public

Safeguard environmental health of golf courses and enhance their role as environmental service systems



1.5 Alignment with EU Goals

This Roadmap is directly aligned to the priority principles and overall targets set out in the EU's commitment to a carbon-neutral economy under its Green Deal, the EU 2030 Biodiversity Strategy and the Sustainable Use of Pesticides Directive. Most specifically the following elements:

Public safety and human health protection

While golf course landscapes are often accessible to the public, access to playing surfaces is predominantly limited to staff and players, under strict controls.

That said, the Roadmap doubles down on potential direct and indirect exposure risks to humans – both those playing the sport and those who work and might also recreate on and around the golfing landscape.

Very specific expectations and standards are set out which, while are already widely applied across grass roots facilities and Members States, will become even more consistently adopted.

Minimisation of chemical pesticide use

European golf is committed to continue its trend to drive further reductions in the overall use of plant protection products and continue the transition towards lower toxicity active ingredients.

Golf can and will start to communicate more strongly to players and as such has an important advocacy and behaviour change role to play by highlighting the importance of stewardship and environmental protection to a large and often influential audience.

Environmental protection and restoration of biodiversity

Golf is a steward of the natural environment, with on average around 60% of the managed land. We are fortunate to share valuable recreational greenspaces with a wide range of other living organisms – across all key terrestrial and aquatic taxa.

Golf is seeking to play a significant role in the restoration and regeneration of biodiversity, through further naturalisation, conservation management of habitats and species, and protection of environmental quality, including from potential hazards and contaminants.

Pollinator and invertebrate conservation is particularly important here, and itself highlights the connection between naturalisation of ecologically managed landscapes combined with safe, specified treatment of relatively small playing surfaces.

PART TWO

Golf and Sustainability

2.1 Introduction

2.2 Sustainable Golf in Europe

2.3 Sustainable Golf Framework

2.4 Alignments



Golfcourse Stippelberg, the Netherlands

GEO Certified

2.1 Introduction

Over the last 20 years golf has been voluntarily driving sustainability across the sport – in Europe and elsewhere around the world.

Whilst types of activity and levels of progress vary from country to country, broadly action has encompassed:

- association leadership strategies and policies
- facility engagement
- regional research
- practitioner education
- development and roll out of programs and tools
- associated tracking and reporting
- recognition in the form of certification against defined sustainable golf indicators.

Across this spectrum, action has been undertaken at pan-European level, with some consistency across national approaches, and with increasing uptake and impact at local facility level.

In many ways, golf has been at the forefront amongst sport and recreational land management and is the only sport with a 'Sustainability System'* to be accredited by the International Social and Environmental Labelling Alliance (ISEAL).

Looking forward, the sector is further strengthening commitments, and the acceleration of actions and results.

The ambition is to be part of the solution towards a range of priority environmental and social challenges. To play a meaningful and credible part in addressing many of the defining issues of our time.

To protect and restore nature rich landscapes that are utilised by a range of people, and which strengthen and support sustainable communities. All the time driving the efficient use of natural resources such as water, energy and raw materials, reducing waste and pollution and corresponding carbon emissions.

Golf's efforts have been driven by recognition of opportunities, threats and needs.

OPPORTUNITIES

Efficiencies, improved landscapes, enhanced environment, enhanced pride, reputation and corporate sponsorship are all powerful opportunities.

THREATS

There are signs that climate induced extreme heat, drought, related regulation, resource availability and public perception are all starting to negatively impact the sport.

NEEDS

Over-consumption and associated waste, pollution and emissions are degrading the environment, and pushing the planet to dangerous tipping points that most impact the less well off in society.

2.2 Sustainable Golf in Europe

- A growing number of national golf associations and grass-roots facilities are implementing robust sustainability strategies. Leadership hotspots include: Belgium, Czech Republic, Denmark, Finland, France, Germany, Iceland, Ireland, Italy, Netherlands, Sweden and Switzerland.
- A range of major professional tours and tournaments have significant sustainability and climate action programs in place, including DP World Tour, Ryder Cup Europe (leading Europe / USA men's event), Ladies European Tour, Solheim Cup (leading Europe / USA women's event), The Open (leading global Major).
- These are supported by various efforts from pan-European and international associations including: The R&A; Federation of European Golf Greenkeepers; Club Managers Association of Europe; Confederation of Golf professionals; European Institute of Golf Course Architects.
- Research programs have stemmed from key bodies and initiatives including: The R&A Golf Course 2030; Scandinavian Turf and Environment Research Foundation (STERF); University of Pisa; University of Sevilla, AGREF; Wageningen UR; University of Applied Sciences Osnabrueck etc.
- ISEAL accredited and endorsed sustainable golf standards, tools, indicators, assurance, certification and reporting has been facilitated by the non-profit GEO Foundation for Sustainable Golf.

Leadership in sustainable sport

There is a rapidly emerging movement in sustainable sport. It is taking place across amateur, collegiate and professional sport, in Europe and around the world.

Leadership efforts are emerging from major rights and event holders including the International Olympic Committee.

Various pan-sport platforms have emerged in the last decade, including UN Sport for Climate Action; UN Sport for Nature; Green Sports Alliance (GSA), Sustainability and Sport International (SANDSI), EU Green Sports Hub.

Within the European Commission, the Sport Unit has drafted White Papers on the role of sport to deliver on the EU Green Deal and in particular sport's role to engage, inspire and drive behavior change amongst millions of citizens.

Golf has been at the forefront of the movement, including representation on many working groups.

EVOLUTION OF SUSTAINABLE GOLF IN EUROPE

1990's

Working groups and early research into the relationship between golf and the environment, with strong focus on protection of environmental quality and water, pollution prevention, fate of pesticides and fertilisers.

2000's

Movement across many national / regional golf Federations. Establishment of R&A Golf Course Committee, STERF, GEO Foundation. Ongoing research, evolving into wider ecological, ecosystem and social topics. Strengthened partnerships and collaborations with governmental agencies, NGO's and other external institutions

2010's

EGA / Golf Europe initiative increases visibility and engagement in Brussels including showcasing Ryder Cup and Solheim Cup as high-profile, global golf events played under the European flag. Further development and ISEAL accreditation of sustainable golf standards, programmes, indicators, assurance and certification (international system and national initiatives).

2020's

Emerging net zero strategies; contributions to the UN Sport for Climate Action and Sport for Nature Frameworks. Strengthening of sustainable golf indicators and database, and emergence of Sustainable Golf reporting and insights consistent across clubs and countries.

2.2 Sustainable Golf Framework

Through over twenty years of ongoing ‘materiality assessment’, golf has recognised its sustainability priorities.

These being the issues to which the sport has greatest connection and dependencies, and to which the sport can make the greatest positive impact.

This agenda – four themes and twelve action areas, is fully integrated across golf’s international sustainability programmes and solutions and is increasingly being adopted by national associations and local facilities.

One of the priority action areas is the responsible and sustainable management of turfgrass.



Habitats and biodiversity
Responsible turfgrass management
Pollution prevention



Water resource management
Energy efficiency and renewables
Materials and circular economy



Health and wellbeing
Outreach and education
Communications and behavior change



Emissions reduction
Increased sequestration
Credible mitigation

2.3 Alignments

While golf's framework is structured to enable the sport to deliver on practical priorities weighted and aligned towards the unique nature of the sport, the agenda is also closely aligned to wider frameworks and platforms, including the United Nations Sustainable Development Goals, The Paris Climate Agreement and the EU Green Deal.



Golf is committed to help make Europe climate-neutral, and to demonstrate publicly how protecting our natural habitat is good for all people, the planet and profit.





Golf contributes to all 17 UN SDG's in some way, but a number are most closely and directly related to the sport.

PART THREE

Progress to date:
Sustainable Turfgrass

3.1 Principles

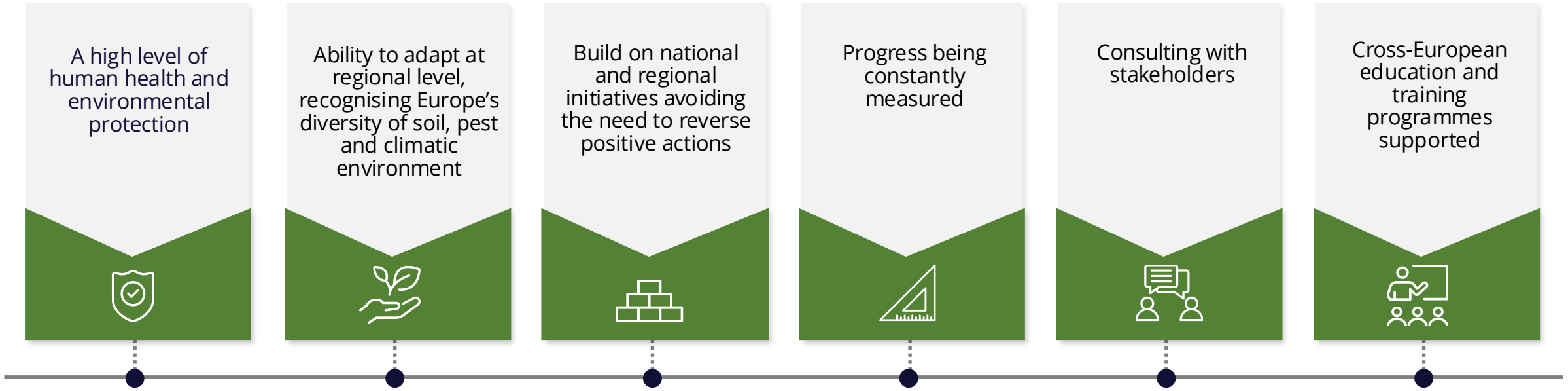
3.2 Key actions undertaken and outcomes achieved



Golf de Chantilly, France

3.1 Principles

As highlighted, progress in a range of aspects of sustainable development and climate action have been underway and strengthening across European golf over recent decades. With this, **key principles for ensuring effective turfgrass sustainability across Europe** are:



3.2 Key actions undertaken and outcomes achieved

More specifically to the management of turfgrass areas, we have seen the following primary activities and progress. Efforts have been driven by focused research across these and other aspects of golf and sustainability.

1	Human and environmental protection
2	Application of IPM
3	Monitoring and reporting
4	Grass species breeding and selection
5	Applied research
6	Practitioner education
7	Use of approved active ingredients
8	Prioritising playing surfaces
9	Precisely targeted applications
10	Efficient irrigation and nutrition
11	Decision supporting tools
12	Stakeholder collaboration

Actions undertaken and outcomes achieved to date

1

Human and environmental protection

All golf courses in Europe operate in regions where it is a legal requirement to ensure protection measures are in place. No access periods; no spray zones; crop sprayer and applicator certification and training; protective equipment; adherence to wind and weather patterns are applied practices relating to safety and pesticide use on golf courses.

2

Application of IPM

Integrated Pest / Turf Management approaches are well researched, developed, articulated and applied across golf. There is already relatively good consistency across European countries. Emphasis on plant health, mechanical and cultural practices, good diagnosis and setting of damage thresholds is common.

3

Monitoring and reporting

Golf has invested in the development of a range of internationally applicable and nationally focused tools to track IPM, associated chemical use and also a range of other sustainability and climate indicators.

Actions undertaken and outcomes achieved to date

4

Grass species breeding and selection

Researchers and plant breeders have invested heavily in developing climate, disease, pest and wear resilient grass species for golf. These have proven benefits in reducing levels of pesticides, water, fertiliser and other inputs.

5

Applied research

Over the last decades an increase in applied research on turfgrass management in the golf sector has been conducted. These R&D efforts have had a focus on practical and ready-to-use research results towards practitioners and clearly drove down pesticide use and increased environmental protection work with new knowledge developed.

6

Practitioner education

Most practicing course managers in European Golf are receiving some form of formal or vocational education. Specialised courses and programs exist, in which IPM provides the spine of educational content and prioritisation of skills and practices.

Actions undertaken and outcomes achieved to date

7

Use of approved active ingredients

Over the last decade products and active ingredients approved by the EU for amenity use have come with lower impact on the environment and non-target organisms. Evidence of 'off label' use of agricultural products in golf remains rare, but not a complacency.

8

Prioritising of playing surfaces

Over recent years a major trend in golf course management has been the naturalisation of golfing landscapes. This has had the effect of not only reducing the overall area of turfgrass surfaces but has been combined with applications of pesticides on priority playing surfaces – primarily greens, tees and fairway landing zones (not the entirety of the fairway).

9

Precisely targeted applications

With practitioner and management awareness and regulation increasing, combined with costs of pesticides increasing, widespread treatments of chemicals on golf courses is less common. Products are typically applied on specific areas to solve or prevent specific known problems. Application techniques are focused on efficacy of treatments.

Actions undertaken and outcomes achieved to date

10

Efficient irrigation and nutrition

In parallel to pest and disease management, golf has also worked hard on research, development, best practices and technological solutions for minimising the use of water, transitioning to recycled sources; applying the minimum water to keep grass healthy; and feeding grasses the minimal level of nutrition to sustain a hardy and durable sward.

11

Decision supporting tools

Developed and introduced over recent years, a range of new diagnostic tools show their value in predicting pests and diseases earlier in their development stages. With that the opportunity to manage them more efficiently with lower impacts and better control. These tools have a good potential to be embraced further with scaled results.

12

Stakeholder collaboration

Regular multi stakeholder dialogue over recent years has helped the sport stay up to date with a range of sustainability related pressures and trends, including regulation.

PART FOUR

Looking forward:
Sustainable Turfgrass Action Plan

- **4.1** Introduction
- **4.2** Priority voluntary and co-regulatory activities
- **4.3** Actions, Targets and Timelines
- **4.4** Golf's positioning on pesticides
- **4.5** Needs from stakeholders & support actions from regulators, NGO's
- **4.6** Summary



Jahne Lehto MG, Course Manager at Hirsala Golf, Finland
Leadership in Sustainable Golf

4.1 Introduction

The critical stakeholders that operate and represent European Golf are committed to a robust forward plan for the safe, responsible and sustainable management of turfgrass over the coming years.

While this builds on progress, adaptation and change to date (including active ingredient formulations), the sector will continue to drive this agenda.

The following 10-point Action Plan proposes to demonstrate a practical way forward.

It provides a highly practical and measurable framework of action and anticipated progress – featuring targets and timelines that will generate further tangible results in safety and sustainability.

EUROPEAN GOLF SUSTAINABLE TURFGRASS 10-POINT ACTION PLAN 2025-2030

4.2 Priority voluntary and co-regulatory activities

Each of the ten priority action areas has a direct bearing on ensuring the sport's commitments and goals regarding sustainability become reality. Each blends voluntary action with compliance to existing regulation, that combined could form the basis for future co-regulatory agreements at European and national levels.

1	Human safety and environmental protection precautions
2	Integrated Pest and Turfgrass Management
3	Monitoring, reporting and target setting
4	Consumer education (golfers)
5	Practitioner education
6	Targeting pesticide use on specific playing surfaces
7	Applied research
8	Technology – innovation
9	Technology – products
10	Partnerships and collaboration

4.3 Actions, Targets and Timelines



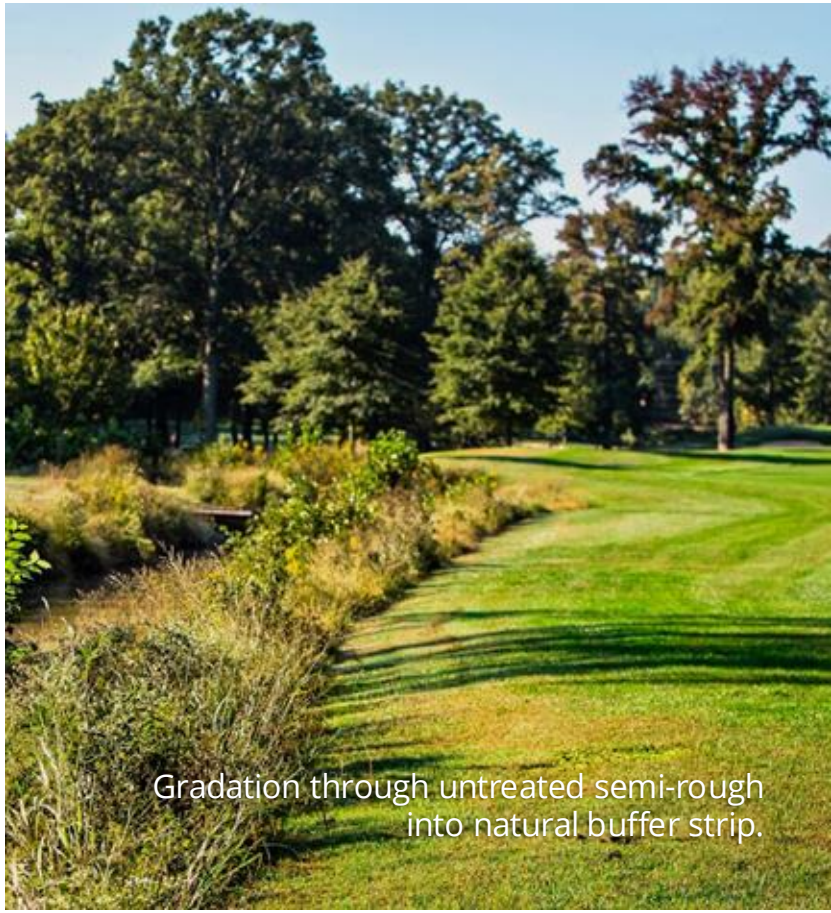
1. Human safety and environmental protection precautions

OBJECTIVE

Further putting EU Occupational Safety & Health Legislation in place by implementation of best practices for the storage, handling, application and disposal of all chemicals and hazardous materials.

ACTIONS

- Consolidate international application of defined industry requirements for operator safety, player safety, public safety and environmental protection.
- Further track application of these and other key ITM / IPM best practices for safety and pollution prevention.
- Continue research projects into human and environmental risk to ensure safety measures are delivering intended results, including research on pollution and emission controls.



Gradation through untreated semi-rough into natural buffer strip.

2. Integrated Pest and Turf Management

OBJECTIVE

To clearly define what IPM / ITM is in golf, how it achieves control and its benefits.

ACTIONS

- Review and unify all IPM / ITM definitions, principles, methodologies and associated best practices across Europe to meet the objective of IPM & ITM.
- Ensure alignment and linkages with other turfgrass topics including water, materials and energy
- Ensure integration consistently across formal and informal education of course managers and greenkeepers
- Ensure integration of updated principles, methodology and practices into Voluntary Sustainability Standards (VSS)
- Consolidate updated IPM/ITM methodologies into central accessible, regionalised, sustainable golf platform (turfgrass section) for golf facilities
- Undertake surveys into IPM/ITM practices being carried out across European Golf courses



3. Monitoring, reporting and target setting on pesticide use

OBJECTIVE

Digitally track, record, monitor and report European Golf's pesticide use through the national golf federation, greenkeepers associations and/or government to establish baseline use, track progress and develop further reduction focus towards minimum levels.

ACTIONS

- Explore how best to connect existing databases, platforms and apps
- Carry out baseline inventory
- Continue to build out IPM and sustainable golf monitoring and reporting with facilities, countries and internationally
- Ensure existing 3rd party assurance / verification for sustainable golf fully integrates any updated IPM / ITM methodologies
- Verification to an accredited standard for quality of data and data handling (ISO9001)
- Follow-up/end evaluations on reduction progress



4. Consumer education (golfers)

OBJECTIVE

Seek a culture change by elevating golfer awareness, including consequences of their demands on playing quality/aesthetics and subsequent impacts on resource use, human health protection and environmental risks. Educate on needs for seasonality of golf course conditioning, and difference between playability and aesthetics.

ACTIONS

- Survey golfer attitudes in relation to sustainability, fair playing quality and aesthetics to find out more about overall outlook, plus levels of flexibility and tolerances
- Publish articles in golfer facing magazines, websites etc to inform consumers of consequences of the desire for 'perfection'
- Engage professional tours and tournaments to promote key messages to fans



Example of on-course golfer communications

5. Practitioner education (greenkeepers)

OBJECTIVE

Ensure practicing course managers and greenkeepers are trained and educated to deliver IPM / ITM in practice and supported within golf clubs and courses to withstand pressure from golfers that would drive less sustainable practices.

ACTIONS

- Created in collaboration with national and regional education and training providers
- Review all current course content for formal and informal / vocational education and qualifications, including sustainability technical and leadership skills
- Update approaches, learning outcomes and content in line with updated and consolidated ITM methodologies and practices, and aligned to updated sustainability principles, goals and best practices
- Explore means to connect course manager education provision and track educational progress, determined levels of skills and qualifications across Europe



Trainee greenkeepers receiving practical education.

6. Targeting pesticide use on specific playing surfaces

OBJECTIVE

Ensure the minimum quantity of plant protection product are being applied to the minimum required playing surface towards fair playability and competition, further focusing on precision application techniques.

ACTIONS

- Undertake further research into biological management of greens, tees, fairways and managed roughs
- Create new generation of practical guidance on biological management of greens, tees, fairways and roughs, including setting playing performance guidelines and damage thresholds for weeds, pests and diseases on golf courses
- Quantify impacts / further reductions in pesticide use through further targeting of applications



Carefully targeted treatment of a putting green by trained and accredited operator

7. Applied research

OBJECTIVE

Create and implement a coordinated and effective turfgrass research agenda until 2030.

ACTIONS

- Continue research into the evolution of pest and disease prevalence and damage across Europe
- Continue research into turfgrass species and varieties, cultural, mechanical and biological approaches to pest and disease management across Europe
- Further research into non-chemical / biological maintenance options for weed, pest and disease impacts
- Further studies of current and predicted climatic changes on weed, pest and disease frequency and intensity across Europe
- Further studies into pollinators on golf courses across Europe, with specific aspects looking at evidence of pesticides use having impacts on diversity, richness and population dynamics
- Inventor and analyse the scientific environment for sustainable golf
- Explore EU research funding

GC2030

Thought leadership, practical publications and guidance are produced by The R&A to not only increase the adoption of sustainable golf practices, but offer solutions to climate change effects and ensure the best playing conditions for golfers.

Through fact-based evidence as part of GC2030, we are contributing and promoting environmental excellence and world-class leadership in resource efficiency, conservation and social value of golf facilities.

The outcomes from GC2030 should help course managers sustain, perhaps even improve, course conditions and playability.

8. Technology – innovation

OBJECTIVE

Accelerate the uptake and scaling of latest diagnostic and predictive technologies, that enable more effective and targeted treatment of pests and diseases.

ACTIONS

- Undertake research projects to identify and evaluate latest digital, GPS and other scanning technologies for diagnosis and efficient treatment of pests and diseases
- Work with equipment and technology manufacturers to review innovations and technologies already available and push precision techniques further
- Create new guidance for sector, supported by case studies that promote advantages of new technologies



Hyperspectral imaging to predict pest and disease risk. Forecasting pesticide reductions of 50-70%.
Golf de Chantilly, France

9. Technology – products

OBJECTIVE

Based on IPM hierarchy, bringing newer generation and lower impact products to market

ACTIONS

- Continue to collaborate with manufacturers to develop more resistant grasses, preventive and mechanical treatments, precision techniques and biological controls
- Review and undertake applied research into human and environmental health risks of application of approved biological products
- Improve independent education and knowledge sharing across Europe relating to approved biological products, risks and risk management for use



Ongoing focus on soil and plant health to increase drought, disease and wear tolerant surfaces that require less chemical treatment

10. Partnerships and collaboration

OBJECTIVE

Ensure golf is addressing sustainability and turfgrass issues as cohesively and effectively as possible. Liaising with and learning from governmental and non-governmental agencies, leading practitioners, academics and manufacturers.

ACTIONS

- Establish cooperation and collaboration with EU institutions, including sport unit, DGs, pesticides approvals and other scientific units
- Present sustainability strategies and roadmaps as basis for co-regulation and collaborative delivery
- Partner with golf industry and wider academic and research bodies to share information and learnings
- Engage with civic groups and NGOs to build mutual understanding, trust and productive collaborations for joint goals
- Based on IPM-hierarchy, work with manufacturers to share information on preventative and mechanical treatments, precision techniques and biological innovations, industry performance, product safety (REACH) and ongoing product efficacy
- Encourage national and regional examples of the same as outlined



Sustainability Group, Amsterdam May 2022

4.4 Golf's positioning on pesticides

EUROPEAN GOLF HAS THE AMBITION AND AIM TO ENSURE QUALITY OF PLAYING SURFACES WHILE MINIMISING CHEMICAL PESTICIDE USE.

Based on a to be established baseline and coordinated monitoring, across the EU27 and beyond, with digital recording and reporting of pesticide use.

The challenges to golf of pests and diseases will not go away and will indeed evolve. Moreover, the climate and soil diversity across Europe will mean different regions will have different challenges and need different solutions. It will therefore be essential that national and local solutions will be able to continue within the EU policy framework.

While innovation continues, **we believe further meaningful reductions in pesticide use can be achieved by the coordinated sharing of best practices, research programs, a culture change within golf, broader golf stakeholder awareness-raising and partnership.**

It will be important to ensure that minimisation of chemical pesticide use does not result in other sustainability parameters being compromised, e.g. reduced biodiversity due to keeping the Rough playable and increased use of water. We will therefore ensure other environmental parameters are measured.

Progressing towards further meaningful reduction in the use of synthetic pesticides will require all kinds of innovations to be developed, tested and made available. As part of an ongoing review, European Golf will commission an independent report on the status of the availability of all these kind of innovations (including low risk and biological products) to overcome current challenges as it relates to pests and diseases on European golf courses.

4.5 Needs from stakeholders & support actions from regulators, NGO's

This Roadmap sets out the basis for an action plan, leveraging existing initiatives as well as investing in new ones where needed. **This will require new resources to support an unprecedented set of data collection in a harmonised way across Europe.**

The Roadmap will need to be refined in order to meet evolving demands and needs. As such, the European Golf Association welcomes and will encourage dialogue with stakeholders in order to seek their input, views, advice and support.



4.6 Summary



AMBITION	Our Ambition for Sustainable Golf **TO BE A LEADER IN SUSTAINABLE SPORT WHILE GROWING THE GAME OF GOLF IN EUROPE**
VISION	Our Vision for Sustainable Turfgrass and Golf **TO DELIVER LONG-TERM PLAYABILITY WHILE ENSURING A HIGH LEVEL OF HUMAN AND ENVIRONMENTAL PROTECTION**
GOALS	GOAL 1: **Safeguard the future of golf** GOAL 2: **Safeguard human health for our staff, players and the public** GOAL 3: **Minimise the environmental impact and enhance the environmental benefits of golf**

TARGETS

- Seek a culture change with course resilience, sustainability and season-long playability prioritised over aesthetics as well as embracing measuring and reporting practices
- Ensure golf course playability levels are sustainably developed
- Ensure European golf competitivity as a tourist destination is increased with socio-economic benefits for local communities
- Collaborate, share experiences with and learn from others to enhance sports sustainability

Ensuring staff, player and public health:

- Implement a code for safe use of pesticides

Expanding takeup of sustainability guidance for golf course managers and greenkeepers:

- Promote sustainable management, renovation and construction of golf courses

Further meaningful reductions of synthetic pesticide use:

- Strictly apply the unified IPM hierarchy with chemical pesticides as a very last resort
- Incorporate a chemical pesticide environmental impact index system to prioritise shift to low-risks/biologicals
- Digitally track, record, monitor and report European Golf's chemical pesticide use from 2024 onwards, including baseline use and mid- and final-evaluations
- Carry out an LCA-study on pesticide use in golf
- Formulate and regularly evaluate an innovation agenda (e.g by commissioning an independent report on availability of alternatives)

Furthering the understanding of golf as an environmental service system:

- Measure the role of golf course landscapes as habitats to increase biodiversity with a view to providing guidance to grass roots facilities
- Reach 50% of golfers with environmental messages to increase appreciation for biodiversity

Quantifying golf's benefits in terms of health and society:

- Measure health-enhancing physical activity (HEPA) impact of golf in society