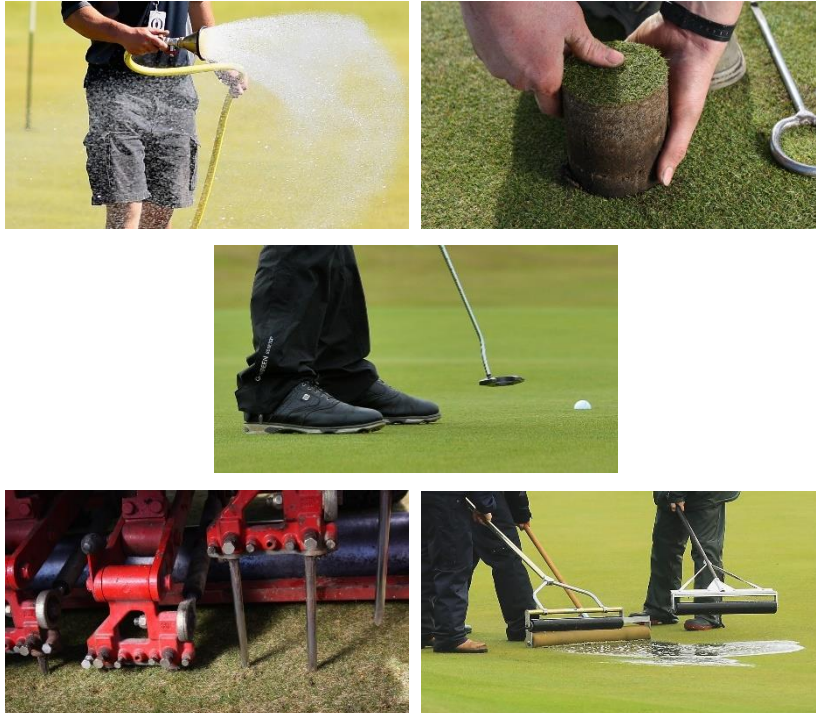


# GOLF COURSE 2030 ITALY



An industry roadmap addressing challenges from, and taking opportunities presented by, the changing climate, resource constraints and regulation to secure optimal golf course condition and playability for current and future generations.

April 2020

## INTRODUCTION TO GOLF COURSE 2030



Golf Course 2030 was initiated by The R&A in 2018. The R&A governs the sport of golf worldwide, outside of the USA and Mexico, on behalf of over 36 million golfers in 143 countries and with the consent of 156 organisations from amateur and professional golf. The R&A is committed to investing in developing golf and supports the growth of the sport internationally, including the development and management of sustainable golf facilities. The R&A continues to lead the Golf Course 2030 initiative, supporting stakeholders to develop the initiative in their own country or region and investing in research, education and other activities to prepare the sport for what may be challenging times ahead.

The main objective of Golf Course 2030 is for industry stakeholders to agree on a roadmap that secures optimal golf course condition and playability for current and future generations by addressing challenges from, and taking opportunities presented by, the changing climate, resource constraints and regulation. The roadmap needs to meet strategic needs at regional, national and local level, and the operational needs at golf facility level.

The remit for Golf Course 2030 is the condition and playability of the main in-play areas on the golf course, from tee to green, including fairways, bunkers, green approaches and surrounds, and the primary rough. However, the roadmap will also need to highlight any impact of outcomes on biodiversity, the local community and the multi-functional capacity of the green space.

Golf Course 2030 seeks to bring the golf industry together to clearly identify the challenges and opportunities facing those developing, designing, building and managing golf courses with regards to the changing climate, increasing resource constraints, and the regulations agenda.

Golf Course 2030 centres on a range of realistic scenarios, from business as usual to, effectively, a doomsday prediction of disruption from extreme weather, water scarcity, high resource costs and limited chemical availability. In this challenging environment it is impossible to see how we can maintain the playing conditions we enjoy today without technological breakthroughs, and changes in attitudes and behaviours amongst many of the sport's stakeholders, including golf club owners, golfers, managers and greenstaff.

In addition to the production of the roadmap, Golf Course 2030 aims to prepare the sport for what may be difficult times ahead; to help ensure that current strategies and solutions are effective; to uncover new solutions which can mitigate some of the challenges; and to make the most of opportunities that arise to enhance course condition and playability.

The process for achieving the objective of Golf Course 2030 will bring stakeholders together to:

- raise awareness of the potential impact of the challenges and opportunities on course condition and playability
- agree priority issues within a region or country
- undertake analysis of current strengths and weaknesses in knowledge and understanding; practitioner education; tools for information dissemination, club engagement, knowledge sharing, tracking of progress, consumer awareness and external relations
- devise and implement forward plans across key areas of strategy
- review progress on agreed priorities and goals, and once successfully addressed, move on to other issues
- engage with decision makers at golf facilities to ensure that proposed solutions are implemented
- highlight the key role to be played by course management staff in delivering an optimal standard of golf course condition and playability.

In this way, Golf Course 2030 will build upon and guide the future development of existing industry solutions and association initiatives, including those that:

- disseminate engaging messages and raise awareness
- engage and support clubs through the provision of best practices, analytical tools, golfer engagement materials and recording of key performance data
- enable credible reporting of evidence of industry best practice and industry progress
- facilitate knowledge sharing
- recognise credible leadership activity in course management.

### **What is optimal course condition and playability?**

Optimal course condition and playability is a subjective and variable term. It reflects the potential for any golf course to provide year-round access to firm playing surfaces which are fit for purpose. The potential of any course will be limited by many factors. Optimal condition and playability could be considered as:

Optimal course condition and playability = Potential x [Site conditions + Design + Construction + Resources (machinery, manpower, materials) + Quality of Decision-Makers/Management + Weather + Golf Objective + Amount of golf/maintenance traffic + Revenue + Regulation]

The Golf Objective in this equation reflects the target market of the course and this can range from Championship standard (challenging), through Recreational standard (appealing to all golf handicaps), to Beginner standard (introductory level to the sport, with limited challenge), or any combination of these standards.

Optimal performance delivers the potential of a course for as much of the year as possible and as consistently as possible.

The optimal performance in terms of the condition and playability of any golf course will vary through fluctuations of the limiting factors, e.g. seasonal weather. Different types of courses will be more or less prone to some of the fluctuations, e.g. thanks to their natural drainage qualities, links will tend to retain greater consistency in terms of optimal performance than will parkland through periods of wetter weather.

## **GOLF COURSE 2030 STAKEHOLDERS**

The industry stakeholders to be engaged in the Golf Course 2030 process are:

- The R&A
- Italian Golf Federation
- GEO Foundation
- AITG (Italian Golf Managers and Greenkeepers Association)
- AITG Corporate Partners
- CIPG (Italian Consortium of Golf Course Owners)
- AIACG (Italian Golf Course Architects Association)
- CMAE (Club Managers Association of Europe)
- EIGCA (European Institute of Golf Architects)
- FEGGA (Federation of European Golf Greenkeeper Associations)
- ETS (European Turfgrass Society)
- ETP (European Turfgrass Producers)
- ITS (International Turfgrass Society)
- European Tour
- Ladies European Tour
- PGA Italy
- U.S. Kids Italy
- Golf Clubs
- Suppliers

External Stakeholders:

- Istituto del Credito Sportivo (Sport Credit Institute)
- Ministry of youth policy and sports
- CONI (Italian Olympic Committee)
- ANCI (Italian Municipalities Association)
- Certes (Italian Sport Turfgrass Research Centre)
- AIPV (Italian Association of Green Professionals)
- Assoverde (Italian Association of Green Builders)
- Turin University
- Bologna University
- Padua University
- CONAF (Italian Federation of Agronomists)
- Resaerchers and consultants
- Legambiente (Environmental NGO)
- Univerde (Environmental NGO)
- Federparchi (Environmental NGO)
- General public and non-golf media

## DRIVERS FOR ADAPTATION



There are considered to be three main drivers impacting on our ability to secure optimal golf course condition and playability for current and future generations; climate, resources and regulation. Golf Course 2030 must assess how the impacts of climate change, availability of resources and increasing depth of regulation will affect day-to-day operations at the golf facility.

### 1. Climate

Due to its latitude extension, orography and sea, Italy has different local climates, that can be grouped together in three main types: alpine climate, continental climate and Mediterranean climate.

**Alpine climate:** interests Alps and inland areas of the Apennines. It is characterised by strong annual and daily temperature variations. Rainfall is on average intense, often snowy during winter. The summer is generally moisty. Rainfall on Alps are reduced from east to west, on Apennines from north to south.

**Continental climate:** is typical of Po Valley; it is characterised by annual temperature variations (about 20°C from summer to winter). There are two rainfall maximum (spring and autumn) and two minimum (summer and winter). The relative humidity is high, due to presence of a lot of rivers and lakes.

**Mediterranean climates:** are strongly influenced by the sea, and we can observe 4 different subclimates:

- Liguria and north Tuscany climate: warm in summer and mild in winter; low annual temperatures variations
- Tyrrhenian and Ionian climate: the rainfall is relatively abundant and concentrated in winter.
- Low Adriatic climate: dry and hot in summer, because the humid air masses that came from Atlantic Ocean are becoming more and more dry.
- Island climate: is characterised by long, hot and arid summers and short and humid winters. Some low rainfalls can happen also in spring. The low rainfalls can cause water supply problems. Some internal areas in the islands have a continental climate.

## Climate changes

### Temperature changes

Estimates of mean temperature trend in Italy reported that temperature increases from 1865 to 2003 of  $1.0 \pm 0.1^\circ\text{C}$  per century. According to the latter there are no significant differences (generally not higher than  $0.3^\circ\text{C}/\text{century}$ ) between seasons and regions.

An estimate of the mean temperature trends in Italy from 1961 to 2006 shows a negative trend for the mean temperature from 1961 to 1980, with a decrease over this time period of about  $0.6^\circ\text{C}$ , followed by a positive trend from 1980 to 2006, with a mean increase of  $+1.54^\circ\text{C}$ . The net variation from 1961 to 2006 is slightly less than  $+1^\circ\text{C}$ , almost equal to  $2^\circ\text{C}/\text{century}$ .

For the period 1961 – 2011, significant trends have been identified for summer days, tropical nights, heat waves, and minimum and maximum temperature extremes at most stations, with warming trends more pronounced in summer and spring and weaker in winter and autumn. From 1978 to 2011, Italy experienced on the average the following variations per decade: an increase of four to five tropical nights and summer days, a decrease of frost days of the same order, an increase of 3–4 % of warm days and nights, and a decrease of 1–1.5 % of cold days and nights. In the same period, heat waves have increased on the average at the rate of 7.5 days per decade.

With regard to the trend of maximum and minimum temperature, in the recent years the situation is reversed compared to 1865-2003 data. As a matter of fact the maximum temperature has increased more than minimum and, as a consequence, also the daily temperature range. Also the summer heat waves have increased both in length and in intensity. 2003 has been not only the hottest year ever recorded during the last 200 years, but has shown the strongest and prolonged heat waves. On the other hand, the winter cold spells have decreased, especially in frequency.

Similar to northern Europe, the Mediterranean region will warm at a rate of between  $0.1$  and  $0.4^\circ\text{C}/\text{decade}$ . The largest temperature increases are projected for southern Europe in the summer months ( $0.2$ - $0.6^\circ\text{C}$  per decade). Projections of climate change (IPCC SRES A1B emissions scenario) suggest an annual average temperature increase in southern Europe in the period from 1980-1999 to 2080-2099 in between  $2.0$  and  $5.1^\circ\text{C}$ , with a median value of  $3.5^\circ\text{C}$ . In the regions bordering the Mediterranean, Italy included, the foreseen warming is greater in the summer.

### Precipitation changes

Differently from temperature, the accumulated precipitations show neither pronounced nor univocal trends on the Italian territory. An analysis of weather stations data shows a significant reduction trend for precipitation for only 2 out of 6 studied regions (central Italy and south-east Italy:  $-10 \pm 3\%/\text{century}$  and  $-8 \pm 5\%/\text{century}$ , respectively). A decrease in precipitation between 1951 and 1996 has been reported of 14% throughout the country but most significantly in the centre and in the south. Reductions of precipitation in some areas during the last century up to 20% have been reported.

An overall reduction trend of the number of low intensity events and a concentration of precipitation in events with higher mean intensity compared to the past has been observed. The total number of rainy days has decreased, especially in the last 50 years: the decrease is about 6 days/century in the north and 14 days/century in the central part and in the south. The overall trend, for all the Italian regions, is in the direction of an increase of precipitation intensity

and towards a decrease of their duration. Also the dry spells are on the increase and their persistence is higher in winter in the north and in summer in the south.

Projections of climate change (IPCC SRES A1B emissions scenario) suggest a decrease of average annual precipitation in southern Europe from 1980–1999 to 2080–2099 of between 4 and 27%. A more pronounced decrease is expected in the summer season.

### Glaciers changes

Scientists consider glaciers to be among the best natural indicators of climate change and, therefore, monitor them closely. Rapidly shrinking glacier areas, spectacular tongue retreats, and increasing mass losses are clear signs of the atmospheric warming observed in the Alps during the last 150 years. The Alps could lose up to 80% of their glacier cover by the end of this century, if summer air temperatures rise by 3°C. If temperature increases by 5°C, the Alps would become almost completely ice-free by 2100.

In the 1970s, about 5,150 Alpine glaciers covered a total area of 2,909 square kilometres. This represented a loss of about 35% of glacial area from 1850 to that time. Accelerated loss of ice cover since then has resulted, today, in a total loss of 50% of the 1850 area, culminating in a volume loss of 5 to 10% of the remaining ice during the extraordinary warm year of 2003.

## 2. Resources



The resources considered essential for today's golf course are likely to become scarcer and cost more, included the land. Between 1971 and 2010 Italy has experienced a loss of 5 millions of hectares of available land, an amount that is equivalent to the extension of the regions of Lombardia, Liguria and Emilia Romagna put together. A research conducted by the ISPRA in 2017 has determined an average soil consumption for 2016 of 3 square meters every second; far less than the 7,6 square meters per second registered until 2009 (the economical crisis has played a major role in this reduction) but it's still a worrying rate. Beyond the implications of general nature, such as the impact of the quality of life and the hydrogeological consequences (often with harmful effects), this issue can represent another obstacle for new golf developments, which are already impacted by the slow and often over-complicated, fossilized bureaucracy. At once, golf itself can represent an element of protection from the urbanization; moreover a sensible planning can use golf development to recover degraded areas such as quarries, brown sites, landfill sites

The same concept applies to water, pesticides, fertilisers, sand, energy, labour, etc. Resource use on the golf course varies dependent on the type of course, e.g. links or parkland, and on the intensity of management related to the area of the course being treated. A golf hole (see image to left) is made up of a number of different areas, which tend to receive different levels of treatment.

The greens (1) are the most intensively managed part of the golf course, yet only take up around 1 hectare of the 60 hectares of an average 18-hole golf course. Fairways (2) are less intensively managed but cover around 16 hectares, so any single input will amount to a greater quantity than a similar application to greens. The teeing grounds (3) and green approach/surround (4) are each of a similar area as the greens and generally receive an intermediate level of management between that of the greens and that of the fairways. The

bunkers (5) are a sand-filled hazard, whose number can vary on any individual golf hole. The maintained rough (6) receives very limited management, mainly mowing. Up to 50% of the area of a golf course can be natural habitat, providing a haven for wildlife.

Under this driver, the golf facility itself needs to be considered as a resource in how it contributes towards issues such as community (multi-functionality), health/well-being, and biodiversity.

The resources whose limited availability or quality might impact on golf course condition and playability in the future would include irrigation water, pesticides, fertilisers, sands and increasing labour and input costs.

### **3. Regulation**

Often directly related to resource issues, water, pesticide and biodiversity regulations are already having an impact on course condition, playability and cost. Regulation on other issues such as fertilisers, energy and waste will also influence the future management of our golf courses. As with the other drivers, the impact of regulation will vary dependent on the type of course, e.g. links or parkland, and on the intensity of management related to the different parts of the course.

Legislation in Italy will need to be considered when assessing impacts on course condition, playability and cost and in devising potential solutions to regulation-led limiting factors.

The main legislation in Italy likely to impact on golf course condition and playability are:

The Action Plan on sustainable use of pesticides, approved in 2014 and repeated in 2020, has strongly reduced the use of chemicals in public areas, included the golf courses. Now no herbicides are allowed and only one fungicide can be use on golf courses. No effective alternative is permitted, including also products allowed in organic farming.

The Environmental text could influence the use of the water in the golf course. Also the possibility of the use of reclaimed water, that should be a new resource in the next year could be conditioned by this law.

Golf Course 2030 also has to take a global perspective and its objectives are aligned with the UN's 2030 Agenda for Sustainable Development<sup>1</sup>. The United Nations Sustainable Development Goals (UN SDGs) provide a valuable reference and golf can contribute directly to the following goals:





**6 Clean Water and Sanitation**  
Water quality and pollution prevention.



**7 Affordable and Clean Energy**  
Transition to cleaner and renewable energy.



**9 Industry Innovation and Infrastructure**  
Innovation to mitigate against challenges.



**12 Responsible Consumption and Production**  
Safe and responsible use of resources.



**13 Climate Action**  
Adaptation, ecosystem services and carbon sequestration.



**14 Life Below Water**  
Protection of water bodies and their wildlife, pollution prevention.



**15 Life on Land**  
Habitat protection, enhancement of biodiversity and pollution prevention.



**17 Partnerships for the Goals**  
The industry working together so it is speaking with one voice, to ensure that there is commonality of language and messaging.

<sup>1</sup> Transforming our world: the 2030 Agenda for Sustainable Development

## FUTURE SCENARIOS



To produce a roadmap that secures optimal golf course condition and playability for current and future generations, there needs to be a consideration of what might be. The drivers for adaption pose many potential scenarios. Presented here are three 2030 scenarios, from business as usual to a potential doomsday prediction of extreme weather, water scarcity, high resource costs and no chemical availability. These scenarios should be related to the current optimal performance of golf courses. It should also be borne in mind that there is a sliding scale between the two extremes cited in scenarios 1 and 3:

**Scenario 1.** Limited change from the environment that now exists as alternative technologies, management solutions and behavioural change address the challenges posed by climate, resources and regulations and optimal golf course condition and playability is secured.

Course condition and playability is comparable to that available today. Drivers for change are weak and opportunities to enhance the potential of golf courses, their performance and environment will not be realised. There could be extra costs for golf businesses that position themselves as early adopters of new technologies, which may be passed on to the customer, so golf could be more expensive.

**Scenario 2.** Severe restrictions in the availability and use of synthetic chemical plant protection products, together with 50% less water being available for irrigation compared with current levels. Alternative technologies, management solutions and behavioural change partially address the challenges posed by climate, resources and regulations.

More months of the year will see greater course closure due to extreme weather events, notably flooding, and more damage and scarring to turf from water and pesticide restrictions, related to hotter summers and wetter winters.

The condition and presentation of surfaces will see periodic troughs, with golfers having to accept a different style of golf and course performance, notably in terms of reduced green speed. There is also the prospect that course condition will improve as turf naturally adapts and firmer surfaces become the norm. Golfers will appreciate and enjoy the seasonal change in course appearance and playability.

There will be increasing pressure on golf facilities to survive as the cost of maintenance increases. This will lead to opportunities for a greater flexibility in course design, e.g. fewer holes, less maintained turf, and an increase in diversification to provide multi-functional green space.

Golf businesses will need to spend more on new technologies and more expensive resources to sustain course condition and playability. Golf will be more expensive to play. Golf facilities will also see a decline in income as deteriorating conditions reduce the attractiveness of the sport, though those that embrace the opportunities for a different type of golf and diversification of land use will thrive.

There will be some course closures, notably those wholly reliant on water and synthetic chemical plant protection products to keep a grass cover, and this will impact on the contribution of golf to the local, regional and national economy.

**Scenario 3.** The banning of all chemical plant protection products and fertilisers, together with 75% less water being available for irrigation compared with current levels. Alternative technologies, management solutions and behavioural change fail to address the challenges posed by climate, resources and regulations.

There will be longer periods of course closure, damage from extreme weather events and disease/pest/weed incidence and the high cost of resources results in loss of customers and permanent closure of many facilities. There are serious consequences for the contribution from golf to the local, regional and national economy.

The combination of hotter summers and less water being available means that only those with sustainable sources of water for irrigation can retain a reasonable cover of grass. Only those that can afford course renovation, a secure water supply and significant levels of extra labour or automation of certain maintenance practices will be able to cope with these pressures and, even in such situations, golf will be regularly played on inferior surfaces compared to what we enjoy today. The use of artificial turf increases for those that can afford it as the problems in managing natural turf become insurmountable.

## **PRACTICAL ACTION**

### ***Guiding Principles for resilient and sustainable golf courses***



The main objective of Golf Course 2030 is the production of an industry roadmap that secures optimal golf course condition and playability for current and future generations by addressing challenges from, and taking opportunities presented by, the changing climate, resource constraints and regulation. There are, however, a number of fundamental, universal practical principles for golf course development and management which extend across the decision-making culture, agronomic practices, and broader considerations of golf's impact on and contribution to nature and local communities. The following is offered as a guide to those in decision-making positions.

1. Plan over the longer-term and operate under consistent policies, which are documented.
2. Prepare for future challenges. Consider the predicted impact of the changing climate (such as flooding, coastal erosion or drought), the availability and costs of vital resources and the constraints placed by regulation.
3. Recognise the professionalism of well qualified course managers and their staff. They will play a vital role in securing optimal course condition and playability.
4. Safeguard the reputation and well-being of employees, employers, golf facilities and the sport itself through strict compliance with the law. Decision makers at golf facilities must support their greenkeepers in adhering to this policy.
5. Create the right environment to produce healthy turf, which is fit for purpose, with adequate access to light and air, and good drainage and a biologically rich growing medium. Select and manage for grass species best adapted to local conditions.
6. Water scarcity and cost are going to be increasing issues for golf. Golf courses should be designed, built and managed to conserve water, using the least required to produce healthy turf and firm playing surfaces. Where feasible, water for irrigation should be generated in situ, through recycling drainage, rainwater harvesting, irrigation reservoirs and other technologies. Where feasible, water derived from non-potable sources should provide the irrigation source. Grass selection should be targeted at species which are fit for purpose, but which require the least amount of irrigation water.
7. The trend is for increasing pressure on pesticide availability and use. It is likely that they will continue to be removed from use. Eliminate reliance on pesticides, identify and transition to alternative solutions to prevent and manage disease, pest and weed problems.

Select and manage for grasses which are fit for purpose and which have the greatest natural resistance to disease infection, pest attack and weed ingress.

8. Fertiliser use is likely to be regulated as part of pollution prevention measures. Select grasses which are fit for purpose with minimal nutritional input and use products which offer the greatest protection to the environment.
9. Excessive organic matter accumulation creates weak turf, prone to stress and susceptible to disease infection, pest attack and weed ingress. Management practices used to control organic matter accumulation, e.g. various forms of scarification and top dressing, cause stress to turf. Select and manage for grasses which are fit for purpose, but which have a slow natural rate of organic matter accumulation and implement management practices, i.e. irrigation and fertiliser, responsibly in a manner which minimises organic matter build up.
10. Cutting height has a major influence on turf health and the requirement for maintenance, with over-close mowing inducing turf stress which requires greater water, fertiliser and pesticide inputs to correct. Mowing heights should be implemented to sustain grasses which are fit for purpose, but which are inherently healthy.
11. Energy derived from fossil fuels is going to become more expensive and golf facilities should be transitioning to cleaner, renewable sources of energy. Course design, construction and maintenance should be focused on energy efficiency, utilising grasses which are fit for purpose, but which require the least input of maintenance resource.
12. Disposal of waste to landfill will become increasingly expensive and socially unacceptable. Course design, construction and maintenance should focus on preventing waste and maximising reuse and recycling.
13. Biodiversity loss is a major global concern and golf courses have the potential to conserve and protect wildlife. Golf courses should be designed and managed to provide quality habitat for as wide a variety of native wildlife as possible.
14. Golf has a responsibility to wider society and the design, construction and maintenance of facilities should focus on making a positive contribution to local communities, such as by providing a multi-functional venue for wider community integration and recreation.
15. Objective assessment of the condition of playing surfaces, particularly the putting surfaces, on the golf course is required to monitor the impact of the challenges facing greenkeepers, the implementation of research outcomes and adaptations in management. This could include firmness, smoothness, trueness, reliability, speed, etc.
16. The recording of key resource metrics for course management, e.g. water, chemicals, energy, waste and biodiversity. Sustainability reporting on course operations is required on a facility, country, region and international level. This is necessary to monitor the impact of the challenges facing greenkeepers, the implementation of research outcomes, adaptations in management and compliance with regulations.

## PROCESS

The main objective of Golf Course 2030 is to help stakeholders develop a roadmap and specific action plans that will help those developing, designing, building and managing golf courses to address the challenges and opportunities from the changing climate, increasing resource constraints, and the regulations agenda facing the industry over the coming decade.

There will be a number of necessary steps in the roadmap towards the production of action plans. The detail of this process will vary depending on the nature of the challenges and opportunities faced by any region, country or facility. Pulling this together should be a collaborative industry effort.

The following process is suggested as a guide:

1. Bring together (or further develop) stakeholder group to ensure the initiative is relevant to the region or country. Ensure group membership is balanced with strategic and technical representation of people focussed on the long-term interests in the future of the sport.
2. Stakeholders identify the challenges and opportunities and agree on priority issues to be addressed over the next 3-5 years.
3. An action plan to be produced which outlines activities to address priority issues. The activities could be awareness raising/communication, campaigns, stakeholder education, research, demonstration projects, etc.

#### 4. Implementation

Action Plans to be taken forward over an agreed time period (3 to 5 years is suggested), with regular (annual) review. Progress should be monitored using Key Performance Indicators.

#### 5. Communicate and educate

Ensure that all stakeholders are aware of the implementation plan and monitoring process. Provide education and interim communications as and where necessary to achieve ongoing stakeholder buy-in.

#### 6. Reporting

Report on progress and level of success in addressing priority challenges. If the priority challenges have been addressed at the end of implementation, return to Step 2 in the Process.

## ANALYSIS OF GAPS, STRENGTHS AND WEAKNESSES



For golf to prepare itself for the future, possibly the immediate future, there is a clear need for stakeholders to consider how the sport can address the challenges and opportunities to how we perceive and enjoy the sport today. An analysis of gaps in knowledge, and strengths and weaknesses of approach and solutions should be undertaken to identify what needs to happen in relation to the identified drivers of climate, resources and regulations, if we are to maintain playing surfaces in line with those we enjoy today. This process should include a review of the likely scenario(s) over the next 50 years, so that the gap analysis can list priorities for identifying solutions. The devised solutions should include the adoption of known best practice, technological innovation, greenkeeping adaptation, attitudinal approach by stakeholders, behaviour change, research, education, etc.

The strengths and weaknesses analysis can inform the structure of pathways for innovation, research, behaviour change and education, as well as ongoing development of club support programmes - together with stakeholder roles, responsibilities and accountability

### PRIORITY ISSUES

The agreed priority issues for Italy over 5 years are:

- Increase the biodiversity in the golf course, reducing the high maintenance areas

The naturalization of the course can have many positive impacts, both on the golf club management side as well as the ecosystem aspects, such as:

- saving of resources as water, fertilizers, hours of labours, fuel
- reduction of CO2 emissions
- increase in biodiversity; naturalization measures can be accompanied by pollinator initiatives, and counteract the substantial decreasing of these forms of life; the Italian Golf Federation, in participation with the AITG, has promoted the initiative Operation Pollinator, and has included it among the measures eligible for the 'Impegnati nel Verde' Award, Category Biodiversity. The IGF promotes also the monitoring of the naturalized areas extension, year by year, through the use of OnCourse
- increased golf course definition

Stakeholders will be engaged in order to draft some guidelines for the correct management of naturalized areas

- Reduce the use of water increasing the use of warm season grasses

More than 70 golf courses in Italy are using warm season grasses. Since 2010 there has been an exponential increase of golf courses that have switched from cool season to warm season grasses, also in areas of Northern Italy that are characterized by a transition climate. This trend has been influenced also by the results of several trials conducted by the Italian Golf Federation in participation with University institutions, and their divulgation through official channels. The use of warm season grasses can help golf courses to:

- reduce the use of water and consequently the energy consumption related to the irrigation system's use
- cope with the pesticides bans, thank to the increased resistance to fungal diseases and the increased competitiveness toward most of the weeds
- present a greater resistance to extremely high temperatures, with remarkable advantages for aesthetic and functional aspects

It will be pivotal to engage the stakeholders in order to carry on further researches of varietal adaptability, especially for the ultradwarf varieties that can be used for putting green surfaces, as viable alternative to creeping bentgrass, as well as for fairway varieties even more resilient to cold climates and/or shaded areas

- Use of reclaimed water for irrigation

Actually 10 golf courses in Italy are using reclaimed water for their golf course irrigation. In some cases, as Puntaldia (Sardinia), the use of reclaimed water is strongly recommended by the local authority in order to avoid the eutrophication that would occur when these water are discharged directly into the sea or a lake: once again it's a demonstration of the role that golf courses can play as filters. However, the use of reclaimed water must be carefully evaluated upon the analysis results. In this regard it's important to engage stakeholders in order to put together the already existing researches and experiences, to carry out further studies and to draft comprehensive guidelines to the use of alternative water sources.

- Evaluate the efficacy of non-chemical alternatives to pesticides

The introduction of the National Action Plan in 2014, with the ban of nearly all the pesticides for the golf course maintenance, has pushed many Italian superintendents to search for non chemical alternatives to pesticides. The Italian Golf Federation as well has launched in participation with Golf Environment Organization and the environmental groups Fondazione Univerde, Legambiente, Federparchi, as well as with the support of Istituto per il Credito Sportivo, the initiative BioGolf: this project aims to promote the development of a biological protocol for the golf courses maintenance. In 2015 Golf della Montecchia, in Northern Italy, has started on its Green Course the pilot project for the BioGolf Protocol and has evaluated also the use of alternative methods for pest control. Other clubs are now following the same path. Some of the alternative methods that have been tried and studied up to date are:

- weed control with the use of pelargonic acid
- weed control with the use of acetic acid



- mechanical weed control with verticuts and brushes
- weed burning
- use of Zoysia matrella for the bunker edge in order to reduce the trimming frequency
- use of different concrete bunker liners in order to preserve the sand and the drainage and to reduce the weeds
- use of ultra-dwarf bermudagrass Cynodon dactylon x transvaalensis Miniverde on putting green surfaces in order to evaluate the adaptability at Northern Italy climatic conditions
- management strategies to improve biodiversity in naturalised rough areas
- use of irrigation water acidification system in order to control the soil pH
- Reduce the use of inputs as oils, fuels and energy

Also thanks to the institution of the “Impegnati nel Verde” award Category Energy several golf course are encouraged to save energy through the installation of photovoltaic plan, solar panel or to replace some technical systems (climatic power station or pumping station) with new generation systems with greater energy optimization. The price of oil, lubricants and fuel has dramatically raised in the last decade, and it's likely to see a reduction of availability of these elements in the future. The use of hybrid or electric equipment can help golf courses to address these issues thus reducing their operation footprint. Golf courses that have switched to an hybrid fleet have experienced a reduction in fuel consumption up to 20%. However the economical trend in Italy has significantly reduced the maintenance fleet turnover and it's not uncommon to see golf clubs running a 10-years old (and more) fleet. For this reason it will be strategical to work with golf industry stakeholders in order to broaden the range of incentives and discounts schemes available for those golf clubs who are looking to switch to more efficient technologies

- Promote the recovery of degraded areas through golf and the diversified use of land

23 golf facilities in Italy have been built on degraded area, mainly quarry sites and landfill site. Developments of this kind can be an answer to the reduced availability of land (together with its rising costs) and can represent also a viable option for the realization of small, low cost urban golf facilities. Moreover, right now several golf clubs in Italy give already the opportunity to practise other form of outdoor activities on the golf course, and this trend is growing. The most common are: skiing, hiking, biking, birdwatching, footgolf. Multifunctionality includes also the harvesting of goods as olive oil, wine, honey, vegetables. All these aspects can bring together several positive impact on the whole golf industry, as:

- Providing new sources of income for golf clubs, whose economy has been generally impacted by the economical crisis since 2011
- Creating wider membership opportunities, with a greater possibility to attract families, and providing new selling points for the golf facilities. Moreover is highly likely that, after the COVID-19 emergency, there will be a growing interest and demand for diversified activities that can be carried out in large spaces

- Enhancing the positive image of golf at local and national level

The Italian Golf Federation will continue to promote the recovery of degraded areas through golf and the multifunctionality across golf facilities with outreach actions, such as:

- assignment of 'Impegnati nel Verde' award for the special Category 'Landscape Environmental recovery', instituted in 2005 for this purpose

- publication of documents on the IGF's official website

- the creation of a special "Green series books":

  - vol.1: Il golf a tavola (Golf at the table)

  - vol.2: Il golf e gli alberi di pregio (Golf and prestigious trees)

  - vol.3: Il golf e le aree protette (Golf and protected areas)

  - vol.4: Il golf ed il patrimonio storico (Golf and historical heritage)

- editing of articles on newspapers, magazines and social media.

- Improve education on sustainability

The education activity carried out for three decades by the Green Section of the Italian Golf Federation trained approximately 2.000 people involved in golf management (Superintendent, Greenkeepers, Golf managers, Golf Pro, Consultants). It's very important to enhance the knowledge on sustainability of all these people and of the new students. This will be possible through:

- wider sessions on sustainability within the training programs

- specific seminars/courses with experts

- development of case studies in collaboration with Golf Club, Universities and Museum.

# GOLF COURSE 2030

## ITALY



An industry roadmap addressing challenges from, and taking opportunities presented by, the changing climate, resource constraints and regulation to secure optimal golf course condition and playability for current and future generations.

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