



ASR REPORT: ASR and Romania's National Welding Capability (NWC) and their significance to the UN Sustainable Development Goals (SDGs)

Introduction by Răzvan Bătrînu, ASR President 2019-21 and Sorin David, ASR President 2022-2024

The Romanian Welding Society (ASR) recently took up the challenge to show how it and the Romania welding industry were both enhancing the country's national welding capability as well as contributing to Romania progressing the 17 United Nations Sustainable Development Goals (SDGs), both now and in the future.

This report co-authored by **Chris Smallbone**, ASR Honorary Member and International Institute of Welding (IIW) Fellow, and **Dorin Dehelean**, ASR Executive Director, assesses how ASR and the welding industry have positively influenced the SDGs and improved the quality of life of people and the environment in Romania and other regional countries. It will also give ASR members the opportunity to assess their companies against the SDGs and their commitments to sustainability.

For the future, it is the intention of ASR to draw up mutually beneficial strategies and action plans with the support of Romanian government departments, industry and aid agencies for implementation to achieve significant progress in UN SDGs for which it and its members have the expertise.

ASR's National Welding Capability Project

ASR, together with its members and networks, has worked for many years to improve the nation's National Welding Capability (NWC).

<https://www.scielo.br/j/si/a/tDWHcwCpMB3tFYY4xTXWZWt/?lang=en>

Improving a country's National Welding Capability can make a significant contribution to, and have a very positive effect on, many national and international programmes including the SDGs.

Such initiatives include, amongst others, education, training, qualification and certification of personnel to both national and international standards, assisting companies to meet the exacting standards of customers, R&D and technology transfer. ASR also assists in improving education and training to increase self-sufficiency and diversity in skilled personnel in Romania and other regional countries.

ASR's excellent national, regional and international networks of individuals and organisations, including the International Institute of Welding (IIW) and its members, universities, colleges, research organisations and companies involved in welding, enables it to cooperate and collaborate with them and leverage many of the activities, including technologies, required to progress the NWC and various SDGs.

What are the UN Sustainable Development Goals (SDGs)

The United Nations (UN), has 193 countries as members and with the challenges of improving the quality of life in countries, in 2015, world leaders agreed for the UN to implement 17 Sustainable Development Goals (SDGs) aimed at low and middle income countries.

Each UN country is supposed to measure its progress on an annual basis against the targets and indicators set against each SDG

https://en.wikipedia.org/wiki/Sustainable_Development_Goals

Romania's Voluntary National Review (VNR) Report, 2018, "Transformation towards a sustainable and resilient Romania" has been updated in 2021 and Romania currently ranks 39 out of 165 countries reporting. The SDGs continue to be a focus of the Romanian Government linked in to many initiatives which the government has implemented to achieve the UN 2030 Agenda for Sustainable Development.

SUSTAINABLE DEVELOPMENT GOALS



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The Way Forward

It is hoped that this report will stimulate ideas amongst the Romanian welding community for feedback to Chris Smallbone allbones@iinet.net.au, and Dorin Dehelean ddehelean@asr.ro as well as for dissemination into countries to improve their SDGs.

ASR and Romania's National Welding Capability (NWC) and their significance to the UN Sustainable Development Goals (SDGs)

Report by

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1 Introduction

The Romanian Welding Society (ASR) and the Romanian Government are supporters of the United Nations (UN) project to continuously improve, both locally and globally, the **17 UN Sustainable Development Goals (SDGs)** agreed to by world leaders in 2015. https://en.wikipedia.org/wiki/Sustainable_Development_Goals

The UN has 193 countries as members and the aim is to improve the quality of life particularly in low and medium income countries. Each UN country is encouraged to measure its progress on an annual basis against the targets and indicators set against each SDG. For example, the Romanian Government was part of the **2018 Voluntary National Review “Transformation towards a sustainable and resilient Romania”** of the High-Level Political Forum on Sustainable Development [1].

The Romanian Department for Sustainable Development is collaborating with the National Institute of Statistics to monitor Romania's progress on the SDGs. Romania has made steady progress towards achieving the UN SDGs and prioritized in particular, SDGs 6,7,11,12,15 and 17 with an environmental dimension although as with many countries, the Covid-19 Pandemic has had a negative effect on the 2021 report.

The progress does however reflect on the partnerships which have been built and strengthened and how collaborative initiatives can result in better outcomes and greater impacts.

Using environmental, social and economic indicators, Romania aims to produce a productive, sustainable and inclusive economy linked to a cleaner, greener, carbon neutral country.

Many of the Romanian Government's flagship programmes and key government departments are at the core of the SDGs.

The SDG Romania Index report can be accessed with the full **Sustainable Development Report 2021** giving the **Global SDG Index and country reports on** <https://dashboards.sdqindex.org/downloads> and [Sustainable Development Report 2021 \(sdqindex.org\)](https://dashboards.sdqindex.org/downloads)

ASR, in conjunction with the welding industry, would like to be working more in line with the Romanian Government's national initiatives, to help Romania to achieve the United Nations Sustainable Development Goals (SDGs) by 2030. ASR is a not-for-profit organisation with more than 800 members comprising, individual and corporate, universities and industrial companies, grouped in 18 branches. Together with the National Research-Development Institute for Welding and Material Testing (ISIM), ASR is a Member of the 50 Member Country International Institute of Welding (IIW).

ASR's excellent national and international networks of individuals and organisations, including the International Institute of Welding (IIW), European Welding Federation(EWF) and SEENET

(South East European Network), would enable it to cooperate and collaborate with them and leverage many of the activities, including technologies, required to progress the various SDGs.

As part of the global community, ASR also embraces collective international action, cooperating where applicable to apply global solutions to global challenges.

A key objective of this report is to act as a catalyst to create a quantum leap in the amount of projects within each SDG which ASR and its welding Industry networks could undertake in cooperation and collaboration with the Romanian Government, industry, the European Union and aid agencies to achieve the UN SDGs by 2030.

For those people, including their organisations, who wish to support and contribute to the achievement of the UN SDGs, please link to a paper titled **“Your Country’s National Welding Capability (NWC) and its significance to the UN Sustainable Development Goals (SDGs)”** by Chris Smallbone, IIW Past President [2].

The paper contains many examples and references to various initiatives across welding-related fields which could be introduced for all 17 UN SDGs. If you wish to discuss such ideas further including you and your organisation’s possible contributions to ASR’s initiatives, contact Dr Dorin Dehelean, ASR Executive Director, ddehelean@asr.ro.

2 The Importance of ASR’s work on Romania’s National Welding Capability (NWC) and Links to the UN SDGs

Welding technology is an enabling technology used across almost all industries in Romania and a wide range of applications, from micro-joining of medical devices, electronics and photonics, to larger scale applications such as bridges, buildings, ships, rail and road transport, pressure equipment, power plant equipment and pipelines.

It encompasses the total life cycle of welded products/structures including design, manufacture, conformity assessment, inspection and testing, operation, maintenance, repair and decommissioning including recycling and other environmental conditions. It is critical to the infrastructure of any country and contributes to improving the quality of life. The importance of welding to national economic performance can be shown in numerous ways [3].

The welding industry is taken as those organisations and people:

- involved with the total life cycle of welded products/structures including design, manufacture, conformity assessment, inspection and testing, operation, maintenance, repair and decommissioning including recycling and other environmental conditions and is critical to the infrastructure of any country;
- engaged in, or employing, any of the organisations or people involved above;
- supplying welding equipment or consumables or materials to be welded; and /or
- involved with education, training, qualification, certification, research and development, work health and safety (WHS), standards and industrial relations aspects of welding.

ASR, together with its members and networks, has worked for many years on improving the nation’s National Welding Capability (NWC) [4]. ASR also has many examples of NWC initiatives it could implement to significantly progress the UN Sustainable Development Goals (SDGs) and improve the quality of life of people and the environment in Romania and other developing countries.

Such initiatives include amongst others, education, training, qualification and certification of personnel to both national and international standards, assisting companies to meet the exacting standards of customers, R&D and technology transfer. ASR also assists in improving education and training to increase self-sufficiency and diversity in skilled personnel in the region.

ASR's excellent national and international networks of individuals and organisations, including the International Institute of Welding (IIW) and its members, enables it to cooperate and collaborate with them and leverage many of the activities, including technologies, which would be required to progress the various SDGs.

For example, cooperating and collaborating with the Bulgarian Welding Society, Serbian Welding Society and the Welding Greek Institute, ASR is part of the SEENET working to transfer the knowledge and experience of world experts into their countries on a regional basis.

Together with SEENET countries, ASR has also been a great supporter of the International Institute of Welding (IIW) and its initiatives to improve the global quality of life [5].

Examples of some initiatives already implemented, as well as examples of opportunities for the welding industry to progress the SDGs are shown below for each SDG although many SDGs are also interlinked. Hopefully, the examples given under each SDG will lead to mutually beneficial projects between ASR, the different tiers of government in Romania, the welding industry and aid agencies.

3 SDG 1 End poverty in all its forms everywhere

Over the years, ASR has been able to show the value and benefits of its work and outcomes of that work to Romania. Many of the examples and initiatives developed by ASR over the years contribute to ending poverty and improving the quality of life.

For example, assessments of the metals industry's effects on social, human, natural and physical/financial living standards have concluded that the metals industry contributes strongly to the economic performance and well-being of countries [6]. In 2021, Business and Economic Research Limited (BERL) conducted an assessment of the potential economic impact of Industry 4.0 technologies in Construction on New Zealand and concluded an increase of 0.5 to 1.0% in GDP could result over the next five year period [7]. Similar assessments in Romania would probably give similar results.

ASR is also now focusing on the introduction of Industry 4.0 which is anticipated to give unprecedented transformation to Romanian industry. The introduction of new and appropriate technologies besides saving time, will boost productivity, reduce waste, expand business models and be more responsive to fast changing environmental and consumer demands. Similar approaches can be used for associated regional countries.

The vast majority of people in Romania simply want a decent job, food, education, health, safety and security and a roof over their heads for their family as well as a decent environment in which to bring up their children. ASR, its members and welding industry initiatives could help progress such aspirations through the implementation of welding and related technologies.

4 SDG 2 End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.

ASR and its members, have many examples of how the technologies developed over the years in its global networks have helped ensure the reliability of plant for processing food as well as the reliability and integrity of the food itself.

It has been shown that it is critical to ensure a competent industry is available using appropriate technologies to be able to build, repair and maintain the relevant plant for such food processing and food transportation as well as agricultural equipment and facilities.

It is also essential for the welding industry in a country to supply significant support to farmers of all categories through the provision of facilities, equipment and consumables for the maintenance and repair of agricultural equipment and plant.

Even if one is in a region of subsistence farming, collective farming or individual large farms, access to skilled people and equipment is essential both to make components and perform repair and maintenance using welding.

A key objective therefore should be to train as many people as possible in the area in the appropriate welding skills and knowledge for any eventuality which may arise. Such people can also use the skills and knowledge for non-agricultural purposes as well and develop other businesses in the rural areas as well as increase the opportunities for employment in various industries.

There could be many opportunities at the micro-enterprise level to develop true entrepreneurial cultures. Romania has therefore excellent opportunities for promoting “start-up initiatives” in many areas both urban and rural. In the welding field, this could include youth acquiring basic skills in welding through to engineering personnel with degrees and diplomas.

The resources required to train such people to operate an SMME (Small, Medium and Micro Enterprise) are readily available and can be incorporated into the welding training courses at the different levels.

5 SDG 3 Ensure healthy lives and promote well-being for all at all ages.

Improving health infrastructure and medical equipment has been a constant priority of successive Romanian governments and the universal access to essential drugs a particular priority as well [1].

To ensure the continuous well-being of people in a country and continued accessibility to health systems to increase life expectancy, welding and joining technology transfers are needed and contribute to meeting various medical objectives including examples such as those developed and implemented by IIW Members, for example, TWI (UK) related to medical devices.

The integrity and reliability of the plant and equipment to produce pharmaceuticals, medical gases and medical radioisotopes relies on the availability of competent welding personnel and companies as well as appropriate welding related technologies.

Medical radioisotopes are classified as essential products and production of these has taken place at the Nuclear Medicine National Centre. Companies in the welding industry produce medical gases and are involved in installing them into the national networks of hospitals and medical facilities. The criticality of this industry was shown recently by the reported massive need for oxygen during the Covid-19 crisis.

Providing new and rehabilitated infrastructure such as hospitals, outpatient clinics, emergency departments, integrated community centres and providing more ambulances to give increased capacity for emergency response are all areas in which the welding industry plays roles [1]. Improved road infrastructure and vehicles also contribute to improving road safety and reducing traffic deaths.

The welding industry plays a key role in ensuring that people involved in welding are protected from a health and safety viewpoint. Involvement with many organisations from industry, government, standards organisations and IIW amongst others, enables the appropriate

standards, guidance notes and educational materials to be used throughout the country to continuously improve the well-being of people.

6 SDG 4 Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

The Romanian Government has promoted social inclusion through universalising access to nutrition, health, education, social protection and developing capabilities for entrepreneurship and employment.

Similarly, ASR has created and implemented numerous programmes and opportunities both in its own right and within the International Institute of Welding (IIW) for lifelong learning to take place. It has helped establish closer partnerships between higher education institutions and industry and the development of effective, affordable training systems to contribute to national economic development, international competitiveness and the attainment of social goals.

The development of the International Institute of Welding (IIW) Education, Training, Qualification and Certification programmes and their implementation including the IIW Manufacturers Certification Scheme According to ISO 3834 (IIW MCS ISO 3834) in 47 countries worldwide, illustrates the importance and need for world class personnel and companies to be available in the welding industry in a country.

To ensure that they comply with the appropriate accreditations, ISIM Cert has been approved as an IIW Authorised Nominated Body for Company Certification (ANBCC) and ASR Cert Pers as an IIW Authorised Nominated Body (ANB).

More and more people will therefore be able to access the opportunities in the welding related fields. Such initiatives taking place in Romania have also been offered to associated developing countries. The first IWE qualification courses outside Romania in Belgrade (Serbia), Chisinau (Republic of Moldova), and Istanbul (Turkey), before the creation of ANBs in these countries, were held with the cooperation and collaboration of Romania.

Since the introduction of the IIW/EFW programmes 1189 International Welding Engineers (IWEs), 11 International Welding Specialists, 389 International Welding Inspection Personnel and nine International Welded Structural Designers have been trained and qualified in Romania and 115 in the other countries mentioned (Moldova, Serbia and Turkey).

This positive impact increased the development of the close regional collaboration including the effective promotion of the harmonised qualification-certification system developed by the IIW and EWF in both IIW member countries and non-IIW countries such as Bosnia-Herzegovina, Moldova and North Macedonia.

ASR has also implemented many projects on a voluntary basis including improving the image of welding projects. Through the holding of welding skill competitions, welded art exhibitions and competitions, ASR is encouraging as many people as possible to take up the art, trade or profession of welding.

In the IIW 2021 Digital Collection of Welded Art, Liviu Mocan's exhibit "**The Union Arch**" was featured. Prior to the release of the IIW 2021 Digital Collection, Luigi Mistodie, Carmen Rusu and Marius Ivanov showcased the "**The Union Arch**" in their paper "**Virtual Reality Technologies Applied in Metal Art**" at the **ASR International Conference "Welding 2021"** in Resita, Romania on 22, 23 April 2021. It highlighted "**Virtual prototyping**" which allows a reduction in time and costs related to the exhibit's creative development, while also

improving the quality of the final exhibit. The Conference also featured a virtual welded art exhibition.

Welded art provides a number of benefits to people. As a hobby it may help to improve the mental health of people, it is a wonderful tool to improve the image of welding and in some cases provides an income for people with the appropriate artistic skills.

To engage youth from elementary and secondary ages across the country, ASR is working on introducing a new welding simulator program which will use virtual and augmented reality to allow students to try welding in a safe, controlled environment whilst learning about career opportunities in welding and related skilled trades. This may also be included in future ASR **Train-the-Trainer** programmes.

With its global connections, ASR is also in a position to assist government and industry with access to resources, activities and strategies used successfully by organisations in other countries for both educational and career purposes. All this has contributed to improving SDG 4 in welding related fields in the region.

7 SDG 5 Achieve gender equality and empower all women and girls.

Romania has not had a problem of gender equality in the welding field. ASR has always supported programmes in Romania enabling women and girls to enter the welding related fields at various levels and areas such as education, training, research, development and technology transfer accompanied by the appropriate career paths.

One of the best ways to enable women and girls to show that they are competent to perform any type of work is to show that they have achieved the required qualification and certification criteria specified for a particular type of work or application. ASR has always been at the forefront of this approach and has continually promoted and implemented a number of cultures including a skills respect culture.

The future implementation of scholarships and increased support for Science, Technology, Engineering and Mathematics (STEM) initiatives, are examples of how ASR and the welding industry can work even further towards gender equality and greater diversity to progress this SDG.

8 SDG 6 Ensure availability and sustainability management of water and sanitation for all.

Romania faces traditional water-supply challenges, sewerage and water-quality protection and with the growing newer challenges such as the adaptation to climate change, rising food and energy prices and obsolete and insufficient infrastructure, these increase the complexity and financial burden of water management.

In the European Union, Romania is the least developed in terms of having full coverage of drinking water and sanitation services. A significant challenge is the provision of drinking water to rural communities where only 33% of the rural population is connected to the public drinking water network.

The Romanian Government is committed to meeting the requirements of the various European Union programmes and is continually introducing projects to achieve this. The welding industry plays a key role in water management.

The global welding industry has developed and implemented over the years examples of technologies in applications which have led to cleaner, better quality drinking water; more efficient irrigation, less water wastage, more efficient waste water treatment, less pollution, better water capture and increased water resources.

For example, TWI (UK) developed specialized welding processes for environmental lining systems for use in land-fill pits to prevent leaching of toxic elements into the ground and water table below.

The continual transfer of such existing and new technologies into both Romania and regional countries is paramount for achieving this SDG.

9 SDG 7 Ensure access to affordable, reliable, sustainable and modern energy for all.

The energy sector has an essential contribution to Romania's development with a strong influence on economic growth, wellbeing and the environment. Romania has a geographical location which favours wind, solar and water energy which helps the energy sector to become cleaner, more economically robust and technologically advanced [1].

There are many examples of the welding industry being involved in aspects of helping the development of affordable, reliable, sustainable and clean modern energy for the country, including developing industries competent to manufacture and maintain the appropriate equipment.

When one thinks of "clean energy" as renewable energies such as solar, wind, hydro etc, these and other types of energy sources require high quality design, manufacture, maintenance etc. to ensure their reliability.

As the implementation of newer energy sources grows, ASR's support for the transfer of such technologies to the appropriate implementers is also growing.

In the foreseeable future up to 2030, even with a determined effort to move to cleaner energy sources, energy sources such as coal, oil, gas and nuclear will still be in existence and will require the same attention to reliability in service as provided by the technologies in ASR's networks.

For example, the recent agreement for Romania and Canada to strengthen co-operation in nuclear energy is a key move enabling the completion, refurbishment and possible expansion of the Cernavodă nuclear power plant. It is anticipated that this will also assist the integration of the countries' nuclear supply chains, strengthen Romania's nuclear supply chain, develop a highly skilled, mobile and adaptable workforce, production of medical isotopes, hydrogen production and co-operation on small modular reactors.

Promoting the developments in renewable energy, will still require all the benefits of an improving national welding capability. A goal of development will be to reduce life cycle costs to achieve a cost per kilowatt hour of electricity which is attractive to consumers. Lowering fabrication costs, increasing production rates, enhancing durability and reducing maintenance will all contribute to this.

10 SDG 8 Promote sustained, inclusive and sustainable economic growth.

There are many factors which can have a positive effect on the growth of a country's economy. Some of these involve creating the correct cultures within the country. For example, ASR has had a positive influence on cultures related to ethics, skills respect, productivity, quality, work, health and safety, environmental, innovation and service excellence amongst

others in the welding related industries. Examples of how these can contribute to an excellent national welding capability can be easily shown.

ASR, being in the “welding industry”, has a positive effect on economic growth. Innovation and the need to have competent people to play their part in innovation also places emphasis on the importance of education, training, qualification and certification of people as well as certification of companies in the country to improve this SDG. These are areas in which ASR plays a significant role.

The strategies to assist companies with new and appropriate technologies, implementation of post-graduate research scholarships and excellent success of the ISO 3834 company certification programme with over 110 companies certified, all contribute to improving this SDG.

For companies specialising in manufacturing various critical food and pharmaceutical equipment to meet the high standards of the Food and Drug Administration (FDA) organisations, these companies need to employ a very high quality level of welding and by ASR, ISIM and the welding industry introducing such technologies they could meet these exacting requirements.

11 SDG 9 Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation.

Ever since its formation in 1990, ASR has inspired an innovation culture both in itself and in the country. An innovation culture is where everybody and every effort contributes to bringing in something new, to making changes (ideas, methods etc.) whether in simple or complex forms and includes applying inventions and the adoption of R&D outcomes.

Implementation of innovative ideas and processes especially for smaller firms requires an effective link between the firms themselves and sources of technology. Research and development must therefore link in well with what technology diffusion provides but there must be market awareness of the R&D outcomes if technology diffusion mechanisms are to be effective and increase innovation. ASR has been at the forefront in this regard.

Companies themselves must recognise the importance of new technology to their business, and hence R&D, so that the market demand for new technologies continually improves and the level of technology uptake at the individual company level increases.

As an example, a large number of companies implemented new modern welding processes, including the adequate training and updating of welding personnel. This has covered the latest developments and technology transfer for processes such as GMAW, electron beam, laser, MIAB, ultrasonic welding and water jet cutting, all helping to positively improve many of the SDGs. The development of sufficient people as both technology deliverers and technology receptors is critical to ensure that innovation such as this can take place.

Many of the challenges for Romania have been identified on the EU official website **Smart Specialisation Platform** with its article on promoting technological transfer in Romania through Smart Specialisation. ASR has been at the forefront with initiatives such as SEENET.

A special outcome in the region with Romania’s involvement was the creation of the South East European Network for Technology Transfer (SEENET). The formation of SEENET has resulted in many technology transfer activities being held in a cooperative and collaborative

manner between the IIW Members for Bulgaria, Greece, Romania, and Serbia and regional countries such as Bosnia and Herzegovina, Montenegro, Moldova, and North Macedonia.

These initiatives have resulted in outcomes such as funding support from governments and industry for technology support centres in SEENET countries, as well as the transfer to the region of the knowledge and experiences of many world experts across a whole range of critical industrial applications.

The series of SEENET workshops, preceded by a workshop held in Bucharest during the 56th IIW Annual Assembly in 2003, were attended by representatives of governments, welding societies and industry from these countries.

This workshop in Bucharest with the participation of the Romanian State Secretary for Research had a key impact in that public authorities in Romania took up the idea of the importance of technology transfer, the role of professional organizations and the need for close links with industry, which had consequences in the following period.

ASR and the welding industry will endeavour to work with government and regional bodies to contribute and progress any aspects of the new **National Smart Specialisation Strategy** for which it has the resources, expertise and capabilities.

The development of national, European and international standards are also essential to ensure the integrity and reliability of welded components and resilient infrastructure. Romanian industry has helped ensure this through its involvement through ASR being a member of the Romanian Standardization Association ASRO.

The ASR representative at ASRO has been leading for many years the ASRO Technical Committees related to Welding and Non-Destructive Examination and an open meeting of the ASRO Technical Committee 39 "Welding" is organised at each ASR conference with the participation of a large number of ASR members.

ASR regularly organizes seminars for the industry, in particular for welding coordinators, dedicated to the implementation of the new standards and the ASR Newsletter provides monthly news on international, European and Romanian standards.

12 SDG 10 Reduce inequality within and among countries.

It is important to conduct a needs analysis in a country to establish exactly what is required to improve the quality of life in the country and have solutions to improve equality. In the welding related field there are examples of how such needs analyses have been conducted and then used to put in place appropriate strategies and action plans [8],[9],[10].

Since 2000, ASR has held workshops and congresses on technology innovation and national welding capabilities involving Romanian and international experts to identify such needs and implement solutions which all contribute to reducing inequality.

An example of the impact ASR's advocacy activity has had is related to SEENET. Representatives from United Nations Industrial Development Organisation (UNIDO), International Atomic Energy Agency (IAEA), European Union (EU) and the United Kingdom Department for International Development (UK DFID) now Foreign, Commonwealth & Development Office (FCDO) were invited as special guests at the 2006 IIW International Congress in Timisoara and they each presented at the workshop on Technology Transfer.

The possibility of collaboration between the IIW and these agencies was discussed under the banner of the new IIW project "Improving the Global Quality of Life through the Optimal Use of Welding Technologies", as mentioned in "History of the IIW 1990-2015", page 137.

ASR (with more than 800 members, individual and corporate, universities, industrial companies, grouped in 18 branches) through its national and international visibility, the opening of ASR to the needs of the industry, the signing of collaboration agreements with a large number of welding and non-destructive testing associations and institutions in Romania and abroad, as well as to the membership and participation of ASR in EWF and IIW are all contributing to positively progressing this SDG.

ASR is probably in the ideal position to continue to identify such needs, both in Romania and associated developing countries, and provide appropriate solutions. The results which will be achieved will help improve the SDG.

13 SDG 11 Make cities and human settlements inclusive, safe, resilient, and sustainable.

There has been an unprecedented growth of cities over the past seven decades with the need to create safe and affordable buildings including housing as well as safe and efficient public transport. There has also been a growing trend to make such structures resilient to disasters such as earthquakes, fires, floods as well as failures due to shoddy quality.

The global welding industry has developed and applied relevant technologies for use in many applications in human settlements as well as being involved in appropriate organisations related to the welding, stainless steel, aluminium and structural steel industries.

ASR has always promoted the uniform rollout and implementation of the appropriate national, regional and international standards across Romania to ensure the reliability and integrity of welded structures/products. ASR regularly organizes seminars for the industry, in particular for welding personnel, dedicated to the implementation of the new standards and the posting of information via traditional and social media provides ongoing news on international, national and regional standards.

Today, with more has more than 110 companies being certified to the IIW Manufacturers Certification Scheme According to ISO 3834 and more than 3000 certificates having been issued in the main non-destructive testing (NDT) methods during the past ten years by ISIM Cert, these help in making cities and human settlements safe, resilient and sustainable.

Due to the Covid-19 pandemic, both ASR Cert Pers and ISIM Cert introduced virtual activities which have proven to be very successful. Technologies have been developed and implemented catering for the challenges of remoteness of both companies and individuals, and in particular disadvantaged communities, leading to more effective training, education, testing and auditing systems. This has naturally assisted good progress in a number of the SDGs.

14 SDG 12 Ensure sustainable consumption and production patterns.

In order to support sustainable consumption and production patterns, Romania focuses in particular on improving the management of waste, including hazardous waste. The government had introduced a number of programmes and projects through its National Waste Management Plan [1].

There are many examples of sound environmental and Work, Health and Safety {WHS} management practices around the world to assist in control of many wastes related to welding.

An environmental culture of an organisation could be defined as the product of individual and group values, attitudes, perceptions, competencies and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organisation's environmental management.

ASR, through its global networks, has been involved in the appropriate Romanian and EU organisations and IIW Commissions in these areas and the transfer of appropriate technologies into industry and the community at large.

15 SDG 13 Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy.

Energy resources power both domestic and industry needs, and are a key contributor to a country's economic prosperity. The demand for energy increases as a country's economy and population grow. Fossil fuels such as oil, natural gas and coal are examples of non-renewable resources and they cannot be replaced as quickly as they are being used. In contrast, resources that are referred to as renewable energy sources can be used again and again, without depletion, or can be replenished in a short time frame. The wind, sun (solar) and waves are all sources of renewable energy.

The global welding industry, has been heavily involved in related work for many years in all these different types of energy ensuring their reliability and integrity and thus having a significant impact to combat climate change and regulating emissions.

ASR and the welding industry support the **EU 2021-2030 Integrated National Energy and Climate Plan** and where possible will work to achieve the outcomes required by Romania in the five prime dimensions: energy safety, decarbonisation, energy efficiency, the energy internal market, and research, innovation and competitiveness.

Steel is also at the core of a green economy, in which economic growth and environmental responsibility work hand in hand. Once steel is produced it becomes a permanent resource because it is 100% recyclable without loss of quality and has a potentially endless life cycle [11].

ASR and the welding industry will collaborate with government and the steel producing industry to meet the challenges ahead including the benefits to the SDGs through the steel usage by 2030.

16 SDG 14 Conserve and sustainably use the oceans, seas and marine resources for sustainable development.

In terms of challenges below the water, there are many concerns about the whole range of pollution taking place which can have a major significant effect on the marine ecosystems. Since welding is used in numerous applications which will be used in water, the integrity of the welds becomes paramount.

If one considers the range of applications covering ships, boats, oil and gas carrying pipelines and tankers, failures can result for example in fires and oil pollution from small spills to catastrophic damage. The high integrity and reliability of welded structures in marine applications to this SDG is essential.

The expertise in the global welding industry has been used to mitigate such problems particularly through development work and involvement of networks of world class experts. Such technologies could be transferred by ASR into Romanian industry.

17 SDG 15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

Romania's biodiversity can be described as unique and generous going through all levels of the ecological systems, and thus being the main reason why regional partnerships to stop biodiversity decline, tackling species extinction and ecosystems degradation due to anthropic impact are critical[1].

Unfortunately the country has suffered a progressive loss of biodiversity as a result of human activity. In particular, agriculture, industrial development, transportation and the expansion of cities have profoundly affected the biological diversity, both generally and locally [1].

Although there are areas in which welding can have little effect such as agriculture runoff as a pollution factor and the building of dams, the Romanian government has introduced a number of programmes which are leading to a green economy which will have a significant impact on this SDG. The welding industry and related steel producing industry fully supports such initiatives.

For example, welding is used in many critical applications which if failure occurs, varying degrees of contamination and destruction can take place. These can range from catastrophes similar to those mentioned above in SDG 14 through to issues such as sewage spillages onto land and into rivers.

The great benefits of welding, and ASR's and industry's efforts, can be realised however with the proper design, materials, procedures, manufacture, conformity assessment, operations including repair and maintenance as well as decommissioning leading to positive contributions to improving this SDG.

18 SDG 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective accountable and inclusive institutions at all levels.

ASR is an effective, accountable and inclusive institution. It is a member based organisation and is accountable to its members. Through its industry committees, it is accountable to the broader Romanian industry and being a not-for-profit organisation, it puts the needs of industry and communities first. To succeed in its objectives, it ensures that the organisations in its networks are also effective, accountable and inclusive.

A useful approach is to look for 'ethical leadership' in people at all levels. The most successful leaders inspire others to embrace a common goal through recognition of shared values. They build and maintain effective relationships by living and leading with integrity.

ISO (International Standardisation Organisation) has also introduced standards which involve ethical behaviour: ISO 19600:2014- Compliance Management Systems-Guidelines and ISO 26000 Social Responsibility Guidance Document.

ISO 19600:2014 covers establishing, developing, implementing, evaluating, maintaining and improving an effective and responsive compliance management system within an organisation. They are guidelines and the extent to which they are used depends on the size, structure, nature and complexity of the organisation. The Standard falls under ISO Technical Committee 309, Governance of organisations.

Through its technology transfer mechanisms, ASR has the ability to significantly influence this SDG positively through the successful implementation of these standards in industry.

19 SDG 17 Strengthen the means of implementation and revitalise the global partnership for sustainable development.

An important component of achieving this SDG is the use of the formal networks which exist within the welding related industries both locally and globally.

Such networks help in producing a multitude of partnerships, both large and small, ready to work together on appropriate activities to assist in meeting SDG targets in a country.

A general definition of a network is that it consists of a variety of entities (e.g. organisations and people) which are largely autonomous, geographically distributed and heterogeneous in terms of their operating environment, culture, social capital and goals, but that cooperate and/or collaborate to better achieve common or compatible goals.

One only has to consider ASR's networks such as IIW, EWF, Romanian Standards Association (ASRO), International Organisation for Standardization (ISO), International Committee for Non-destructive Testing (ICNDT) etc to see the potential which can be harnessed. A good example of how such networks can assist with this SDG is shown in references [12] and [13]. Reference 12 shows how the Welding Technology Institute of Australia (WTIA) created a worldwide network of technological experts and organisations with remarkable success with technology transfer to Australian industry. Reference 13 shows how the CWB Group built up an Association from 1000 members to over 70000 members over a ten year period. When one considers that there are estimated to be over 35000 welders in Romania, a quantum leap by the welding industry's involvement in progressing the SDGs will make an enormous contribution to the Government of Romania's endeavours.

20 Recommendations

For those people, including their organisations, who wish to support and contribute to the achievement of the UN SDGs, please link to Reference 2 titled **"Your Country's National Welding Capability (NWC) and its significance to the UN Sustainable Development Goals (SDGs)"** by Chris Smallbone, IIW Past President.

The paper contains many examples and references to various initiatives across welding-related fields which could be introduced for all 17 UN SDGs. If you wish to discuss such ideas further including you and your organisation's possible contributions to ASR's initiatives, contact Dr Dorin Dehelean, ASR Executive Director, ddehelean@asr.ro

It is the intention of ASR to draw up mutually beneficial strategies and action plans with the support of the Romanian government, industry and aid agencies for implementation to achieve significant progress in UN SDGs for which it has the expertise.

This report is to be a catalyst for such initiatives and create a quantum leap for ASR and the welding industry to support the Romanian Government to succeed in this major objective by 2030.

References

- [1] Transformation towards a sustainable and resilient Romania. Romania's Voluntary National Review 2018

[19952Voluntary National Review ROMANIA with Cover.pdf](#)

- [2] Your Country's National Welding Capability (NWC) and its significance to the UN Sustainable Development Goals by Chris Smallbone, IIW Past President.
<https://asr.ro/documents/C.Smallbone2021.pdf? t=1639211760>
- [3] Macroeconomic and sectoral value added by the production and application of joining technology in Germany, in selected countries in Europe as well as the EU as a whole. Short version of the expert report, Michael Kersting, Waike Moos and Anna Werbeck Ruhr Research Institute, Bochum 2017
- [4] SciELO - Brazil - Establishing and Implementing the Building Blocks of a Country's National Welding Capability (NWC)
<https://www.scielo.br/j/si/a/tDWHcwCpMB3tFYY4xTXWZWt/?lang=en>
- [5] IIW White Paper- Its Significance to Creating a National Welding Capability 2015, 3rd IIW South East European IIW International Congress Welding and Joining Technologies for a Sustainable Development and Environment, Timisoara, Romania.
- [6] Our NZ metals industry is the first to assess against Treasury's Living Standards Framework <https://www.hera.org.nz>
- [7] HERA report shows adoption of construction 4.0 worth \$8billion
<https://www.hera.org.nz>
- [8] A Comprehensive Advanced Materials Joining and Forming Technology Roadmap-Final Report, Prepared by Tom McGaughy, Hyunok Kim and Harvey Castner, EWI, Columbus, Ohio, 28 April 2017.
- [9] Welding Industry Technology Needs Study-Cooperative Research Centre for Materials Welding and Joining (CRC-MWJ), Planning & Managing Projects Pty Ltd, 30 November 1995
- [10] Smallbone, C. and Kocak M., "IIW White Paper: Improving Global Quality of Life Through Optimum Use and Innovation of Welding and Joining Technologies" Published by IIW 2012 <http://iiwelding.org>
- [11] Sustainable Steel: at the core of a green economy, 31 May 2012
<https://www.worldsteel.org/publications>bookshop>
- [12] "The OzWeld Technology Support Centres Network: A Unique Model for Technology Innovation by Industry" Chris Smallbone, Executive Director, WTIA, ASM/AWS 6th International Conference on Trends in Welding Research 15 – 19 April 2002. Pine Mountain, Georgia, USA.
- [13] WELD Canadian Welding & Lifestyle Magazine WINTER 2021 Vol 04 No 16.
<https://www.cwbgroup.org/association/publications>