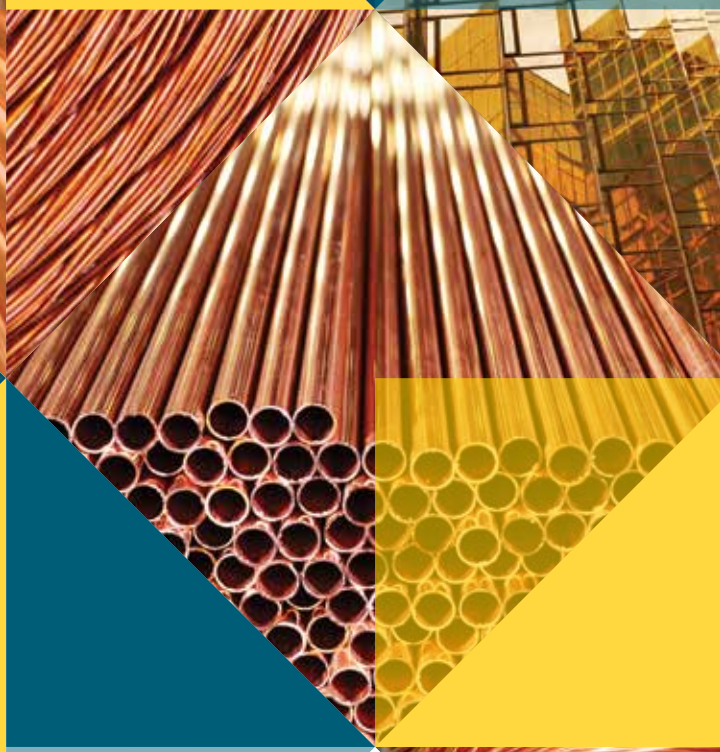
International Copper Association
Copper Alliance

2016 Annual Report



COPPER.
MAKES THE WORLD WORK BETTER.

The Value of Membership

ICA's members represent a majority of global copper production and include many of the largest copper and copper-alloy fabricators. ICA's status as a not-for-profit trade association provides its members with a credible, independent advocate to address challenges faced by the collective industry.

The investments by its members ensure ICA is able to maintain an effective leadership position on behalf of the world's copper industry. By pooling resources through ICA, the industry is able to accomplish much more than any single copper industry company could on its own. The commitment and ongoing investment by its membership base benefits the whole of the copper industry and is critical to sustainable development.

ICA is committed to partnering with its members to increase the percentage of industry funding ICA's efforts to maintain the long-term viability of copper markets.

MEMBERS

As of 31 December 2016

Anglo American
Antofagasta Minerals S.A.
Aurubis
BHP Billiton Plc
Boliden AB
Chinalco Luoyang
Compañia Minera Doña Inez Collahuasi
Compañía Minera Zaldívar
CODELCO-Chile
Daechang Co., Ltd.
Freeport-McMoRan Inc.
Glencore
Golden Dragon Precise Copper Tube Group Inc.
Halcor S.A.
Kennecott Utah Copper Corp.
KGHM Polska Miedź S.A.
KM Europa Metal AG
LS-Nikko Copper Inc.
Luvata
Minera Antamina S.A.
Minera Centinela
Minera Escondida Limitada
Minera Esperanza
Minera Los Pelambres
Minera México
Mitsubishi Materials Corporation
Mueller Industries
Nexans
Outotec Oyj
Pan Pacific Copper
Revere Copper Products, Inc.
Rio Tinto Plc
Sociedad Contractual Minera el Abra
Sociedad Minera Cerro Verde S.A.A.
Southern Copper Corporation
Sumitomo Metal Mining Co., Ltd.
Teck
Tenke Fungurume
Wieland-Werke AG
Yunnan Copper Industry (Group), Ltd.

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ICA VALUE PROPOSITION

WHAT IS THE INTERNATIONAL COPPER ASSOCIATION (ICA)?

- A not-for-profit trade association
- A credible, independent advocate on issues critical to future copper demand

WHY THE INDUSTRY NEEDS ICA

- Industry is more effective, credible and efficient when it works together. ICA makes this possible.
- Without ICA, members would incur major expenditures individually, losing leverage opportunity:
  - Response to Europe REACH regulation. Cost: $12M
  - Response to International Maritime Organization transport requirements: $50 - 100M saved each year
  - Response to plans in China to switch from copper to aluminum in 1.9 Mt copper power cable market

HOW ICA MEETS THE NEEDS OF THE COPPER INDUSTRY

- Active in more than 60 countries
- Working in partnership with:
  - Local copper fabricators and equipment manufacturers
  - Governments and regulators
  - Trade and other end users
- Three program areas:
  - Public Affairs, Market Access and Strategic Communications
  - Maintain copper industry license to operate in complex regulatory environments
  - Ensure market access for copper products
- Market Defense/Growth
  - Prevent or slow substitution by alternative materials
  - Increase intensity of copper use in equipment and in buildings
  - Positive impact on both copper demand and sustainable-development goals
- Image/Reputation Building
  - Communicate messages showing copper makes a positive contribution to sustainable development
  - Position copper industry as a trusted partner of governments and nongovernmental organizations
- Achieved through a mix of health and environmental science, codes and standard setting, direct promotion, technical innovation, market intelligence and strong communications.

DEFINING VALUE TO MEMBERS: ICA IS AN EFFICIENT, MARKET-FOCUSED ORGANIZATION DELIVERING MEASURABLE VALUE TO MEMBERS.

- Annually:
  - Tonnage impact of 250,000 tonnes
- Long-Term:
  - Positive image/reputation for copper and copper industry
  - Continued industry license to operate
  - Insurance against long-term demand destruction

MESSAGE TO MEMBERSHIP

Following an organization-wide restructuring process reported on in the 2015 Annual Report, ICA is a leaner and more focused organization delivering strong return on members' investments. This report reviews developments during 2016, provides key highlights into the achievements of the past year and demonstrates concrete ways that Copper Makes the World Work Better.

In October the ICA Board of Directors approved a new ICA Strategic Plan. The new plan covers a shorter time period—three years, 2017 – 2019—and is a "rolling" plan. At key touchpoints during each year, the Advisory Committee will review the plan to ensure ICA is focused on strategic directions that align with changing market conditions and member priorities. Any formal changes will be presented to the ICA Board for approval.

The key strategic objectives of the 2017 – 2019 ICA Strategic Plan are to:

- Support the industry's license to operate and secure fair market access for its products
- Communicate that copper and the copper industry are positive contributors to society
- Impact tonnage by 250,000 tonnes/year

The single greatest change in the new plan is the launch of a more forceful advocacy effort. This builds on the existing competencies in Health, Environment and Sustainable Development (HESD) and Strategic Communications and will be implemented through a new Public Affairs function. The effort is led by a new Vice President–Public Affairs, Fleming Voetmann. The technical components of the HESD initiative are now led by Andrea Vaccari. In addition, it drives the first two strategic objectives noted above and will comprise approximately 20 percent of the ICA budget going forward.

The bulk of ICA's budget—nearly two-thirds—is in support of the objective related to tonnage impact. This work is organized around five tonnage-based strategic initiatives:

- Energy Policy & Efficiency Standards (EPES)
- Wire & Cable (W&C)
- Building Construction Non-Electrical (BCNE)
- Heat Exchange Systems (HXS)
- Technical & Market Support (TMS)

Rounding out the new plan are strategic initiatives supporting the above with focused activities in:

- Market Analysis & Outreach (MAO)
- Membership, Funding & Partnerships (MFP)
- Governance & Administration (G&A)

MAO is a reorganization of what was referred to as Market Intelligence, Data & Measurement (MIDM) in the last strategic plan. The "Outreach" part of this revised name calls out a new focus area requested by ICA's members. Specifically, through a proactive markets outreach approach, ICA will establish itself as a leading authority on copper end-use markets and the fundamentals of long-term copper demand. Our goal is to ensure commentators on copper markets base their analyses, reports and news stories on factual information. Details on this effort can be found later in this report.

To ensure ICA is well-prepared to understand evolving market conditions and to tailor its strategy and programs to align with market realities, ICA has reformed a Global Strategy Team (GST). The GST is led by Geraud Servin, ICA's Principal Adviser, HESD and Global Strategy, and is populated with cross-functional staff from all regions. The GST will conduct strategic and programmatic analyses and ensure budgetary proposals are of high quality. Output from the GST is ultimately shared with the Advisory Committee. ICA's Management Committee will provide internal oversight.

While the 2017 – 2019 ICA Strategic Plan and the associated strategic objectives are designed to positively impact copper markets and provide value to our members, ICA's work has broad societal benefit. Our Mission Statement was updated to better reflect the dual nature of ICA's work:

The ICA value proposition is stronger than ever, and greater participation from industry will only reinforce ICA's resolve and effectiveness.

"ICA brings together the global copper industry to develop and defend markets for copper and to make a positive contribution to society's sustainable-development goals."

Further to the second part of our mission, ICA conducted an audit of its existing programs against the 17 United Nations Sustainable Development Goals. The SDGs were ratified in 2015 and provide a global framework ensuring meaningful and consistent progress toward a more sustainable world. This audit showed ICA's programs making a positive impact on all 17 SDGs.

ICA's critical work would not be possible without the continuing support of its members. We offer thanks, as always, for these ongoing commitments—particularly in challenging market conditions. We also thank the employees of ICA and its Copper Alliance® affiliates worldwide for their hard work, dedication and professionalism. Effective collaboration between members and management represents the glue that holds the organization together, and we hope the achievements contained in the following pages provide evidence of the strength of this collaborative bond.

Finally, we encourage the leaders of those copper industry organizations that are not yet members of ICA to consider formally partnering with us. The ICA value proposition is stronger than ever, and greater participation from industry will only reinforce ICA's resolve and effectiveness.

In October, Jean-Sebastien Jacques' two-year term as Chairman of the Board of ICA ended. Jean-Sebastien guided the organization through a challenging period, and the ICA he leaves behind is a stronger and more effective one. Hennie Faul, Chief Executive Officer, Copper – Anglo American, will serve as ICA Chairman for the next two years. We thank Jean-Sebastien for his dedication and leadership, and we look forward to working more closely with Hennie in the coming years.

Jean-Sebastien Jacques

Hennie Faul

PROACTIVELY ADVOCATING FOR THE COPPER INDUSTRY

In a world with a never-ending news cycle, it is important for any industry to be on top of its reputation and aware of how its political interests are being represented and discussed. Traditionally, when faced with regulatory challenges, ICA has taken the position that its science will stand on its own. However, today's political arena requires more of a forceful stance from the copper industry and a firm understanding that it takes more than the best science to prevail.

This need for more proactive advocacy and a strong reputation led ICA to create a new Public Affairs function in 2016. This function acts to ensure the copper industry maintains its license to operate and fair market access for its products through proactive advocacy toward government and regulators. ICA's advocacy strategy is based on sound science and data in the fields of health, environment and sustainable development and will be supported with well-targeted strategic communications.

ICA's ability to build relationships and trust is important for ensuring positive impact going forward. Trust comes from the copper industry's reputation, the industry's legacy and current behavior, promises and commitments. The relevance of copper is based on the ability to address society's needs for a more sustainable society and the long-term transitioning toward a low-carbon economy. ICA's new, targeted communications must be more timely, relevant and precise, both online and in one-on-one interactions.

ICA's ability to build relationships and trust is important for ensuring positive impact going forward.

These global issues will become the primary focus for the team and our resources moving forward.

The HESD team is implementing a new "rolling plan approach"—focusing on both regulatory opportunities and risks. The risks and opportunities will be ranked based on business impact. This new approach will draw the focus to what matters most and align resources to key priorities. The approach will also bring consistency globally across the Copper Alliance®.

In addition, the new advocacy strategy calls for the systematic pursuit of strong alliances. ICA already works closely with think tanks, universities and other thought leaders, and in 2017 ICA will establish new, strong partnerships and renew existing impactful alliances.

Another key to the success of the new public affairs function will be stronger online advocacy. Not only does ICA already have a strong online presence in sustinablecopper.org, but ICA's online keystone, copperalliance.org, is undergoing a rework to help viewers find the content they need to make informed decisions.

Together with its members, ICA will continue to invest in a fruitful conversation with policy makers and authorities in order to ensure fair and sound legislation and regulation.

EVOLVING HESD ISSUE PRIORITIZATION

In an effort to increase the copper industry's impact on the most critical issues to the industry, the HESD team spent the second half of 2016 revamping their prioritization framework to more closely map to the new rolling-plan approach of the ICA strategic plan and the Public Affairs strategy. The prioritization framework builds on the group's existing legacy of developing issue inventories and working with regional and global committees to agree on workplans and budgets. Key aspects of the new framework include:

- A robust set of criteria for ranking risks and opportunities via central registers
- A common structure for managing issues that rise to the top
- A focus on opportunities, which will help us become more proactive over time

The structure's global harmonization does not change the way decisions are made. Regional committees remain the authority for determining the priorities in their regions. The global register looks across the regional registers for those issues that appear in multiple places and, therefore, are likely to have a potential for global impact on the market and members. These global issues will become the primary focus for the team and our resources moving forward.

MARKETS OUTREACH AND COPPER'S INFLUENCE ON GLOBAL MEGATRENDS

ICA conducts a wide range of copper-related market intelligence studies and is a leading authority on copper end use and the fundamentals of long-term copper demand. In 2016 ICA began a market outreach program with the objective being to ensure key market commentators use accurate data and informed analyses on copper end use, achieved through active, sustained education and information sharing.

In October 2016, ICA held its first Markets Outreach event in London, just prior to the start of the annual London Metals Exchange (LME) week events. The keynote address was delivered by ICA Chairman Jean-Sebastien Jacques, and speakers presented on topics such as the long-term fundamentals of copper demand, the impact of the 13th five-year China Plan, materials substitution, and more. This event set the stage for future engagement with the analyst and media community.

Following on the success of London, ICA hosted a workshop in Shanghai alongside the annual Metal Bulletin event during Asia Copper Week in November 2016. In 2017 events are planned for CESCO Week in Santiago, Chile, and potentially in New York in June, as well as during LME Week and Asia Copper Week.

These select megatrends are part of a low-carbon future—a future relying on efficient conductors such as copper.

The outreach campaign highlights the importance of copper in the development of sectors underpinning global megatrends. Some examples:

- The International Energy Agency (IEA) has concluded that half of the actions needed to limit man-made climate change to below 2°C can be achieved through energy efficiency. As the best nonprecious conductor of heat and electricity, the products containing copper tend to operate more efficiently and, therefore, emit less CO_2.
- One megawatt of solar photovoltaics uses about four tonnes of copper, and according to the IEA, the global installed base of solar is set to grow from around 230 giga-watts to 1,750 – 2,500 giga-watts between now and 2030. That equates to approximately 7 – 10 million tonnes of copper required to meet the growing solar power-generation capacity.
- Globally, 80 million passenger vehicles are sold every year. Bloomberg New Energy Finance estimates this number will grow to 120 million cars per year by 2040. This source also predicts that by 2040 more than 40 million fully electric vehicles will be sold each year, accounting for 35 percent of total vehicles sales. With 90 or more kilos of copper used in a full electric vehicle—three to four times more copper than used in an internal combustion engine vehicle—the use of electric vehicles will have a major positive impact on copper demand.

These select megatrends are part of a low-carbon future—a future relying on efficient conductors such as copper. Through its Market Analysis and Outreach, ICA is communicating on copper's wide range of end-use markets, greatly improving understanding and appreciation of material use and long-term demand among the analyst and commentator community.

Funding for U4E
now exceeds
$50 million

SCALING UP ENERGY EFFICIENCY WORLDWIDE

Programs related to Energy Policy and Efficiency Standards (EPES) account for the largest portion of ICA's market-development work. These programs both defend and grow markets for copper products. Globally, energy efficiency continues to gain prominence—in particular when it comes to actions limiting man-made climate change. The International Energy Agency (IEA) has stated that half of the actions needed to reach the goals of the Paris climate-change agreement can be met through energy efficiency. Copper plays a critical role in energy efficiency, as copper assures optimal performance from the conductive materials within many high-energy-using products.

Copper plays a critical role in energy efficiency, as copper assures optimal performance from the conductive materials within many high-energy-using products.

ICA and its Copper Alliance partners are seen as credible experts in the area of energy efficiency. This can be seen by ICA's appointment to the IEA's Energy Efficiency Industry Advisory Board. Copper is the only material directly represented in this important group. This credibility comes from more than 20 years of leadership and effective programs advancing energy-efficiency initiatives in dozens of countries.

ICA continues to be a global leader in the regional harmonization of standards. SHINE (www.aseanshine.org), a Private-Public Partnership to promote sustainable-energy equipment and appliances in the ten ASEAN countries, presents a perfect example. The SHINE partnership was formed by ICA and the UN Environment Program (UNEP) in 2010. The primary sources of funding are APEC (Asia-Pacific Economic Cooperation) and the European Union. SHINE has successfully helped the ASEAN to develop and adopt the area's first regionally harmonized minimum energy performance standard (MEPS) for residential air conditioners.

With successful proof that the region can align on an energy-efficiency standard, in 2016 SHINE set its sights higher, and work is underway to expand the scope of the initiative to include motors, distribution transformers and other products. This project is conducted via a partnership with United for Efficiency (U4E), another ICA/UNEP-led initiative focused on market transformations toward energy-efficient appliances and industrial equipment. U4E was introduced in previous issues of the ICA Annual Report, and more information can be found at united4efficiency.org.

Due to the success and momentum in the ASEAN, U4E is replicating the work of SHINE in other regions. For example, the member countries of the Central American Integration System (SICA) region have agreed to harmonize their MEPS for lighting, air conditioners, refrigerators, street lighting and motors. The regional MEPS align with existing standards in Mexico and include regionally harmonized product labels. Work in this region has advanced quickly not only because of SHINE's proven success, but also because of strong partnerships ICA and the Copper Alliance have built with governments and private sector organizations in the region.

Regional U4E projects are in process in the Southern Africa Development Community (SADC) countries, as well as in the Pacific Island States. U4E priorities include all developing-world regions as MEPS tend to be absent or highly inadequate in these countries. Funding for U4E now exceeds $50 million, including country-level U4E projects funded by the Global Environment Facility (GEF) in a dozen countries.

U4E and SHINE are excellent examples of public-private partnerships (PPPs). At ICA's Board of Directors Meeting in October 2016, Mark Radka, Head of the UNEP Climate and Technology Branch, spoke about the critical importance of PPPs in driving the global sustainable-development agenda, and he acknowledged the strong partnership of ICA over many years on numerous projects with UNEP.

Through leveraged funding from organizations external to the copper industry, U4E and SHINE enable ICA to expand its geographic presence without the need to build permanent, costly infrastructures. ICA's Membership, Funding and Partnerships (MFP) initiative looks to replicate this successful leveraged-funding model to expand other copper friendly technologies.

SHAPING CHEMICAL MANAGEMENT IN THE U.S.

ICA's Health, Environment, and Sustainable Development (HESD) program has a long history of advocating for the sound science needed to protect the copper industry's license to operate and fair market access for products. Recent activity around the United States (U.S.) Toxic Substances Control Act (TSCA) is clear evidence that this science does not live in a vacuum. Rather, through strategic partnerships and strong working relationships with regulatory agencies, this science can extend beyond peer-reviewed journals and scientific meeting presentations into the policies and laws member organizations and their customers must comply with.

After over five years of activity in the U.S. Congress, a bill to reform TSCA was signed into law by President Barack Obama on 22 June 2016. TSCA regulates the estimated 83,000 chemicals in U.S. commerce and is implemented by the U.S. Environmental Protection Agency (USEPA).

Until its 2016 overhaul, TSCA was widely viewed as ineffective. Originally passed in 1976, during TSCA's 40-year tenure regulatory action was taken for only five chemicals and testing mandated for approximately 300 chemicals. The development of new, rigorous chemicals management regulations around the world (e.g., REACH in Europe and the Chemicals Management Plan [CMP] in Canada) only heightened the perception of TSCA's dysfunction.

As a result, several states began implementing their own chemicals-management programs, creating jurisdictional inconsistencies that are potentially challenging for members. In particular, 18 states have passed over 70 chemical laws since 2003, with California, Connecticut and Michigan often implementing stricter regulations than those promulgated at the federal level. While these primarily focus on chemicals not germane to the industry, tracking the constantly shifting landscape of regulations across the 50 states to ensure copper use is not threatened is a daunting task, with fear of the unknown a constant concern.

A reformed TSCA will give more power to the USEPA but is expected to reduce the need for such independent actions by the States. Industry and environmental groups alike see these changes as positive, as evidenced by the unprecedented levels of bipartisan support the TSCA reform bill received in both the U.S. House of Representatives and Senate. The revamped TSCA is also largely seen as a reasonable chemicals management program, analogous to the Canadian CMP and with less onerous requirements than European Union's REACH.

Notably, through the strong advocacy efforts of HESD's program partners—particularly the American Alliance for Innovation, through the North American Metals Council (NAMC)—the TSCA reform bill includes several metals-specific provisions that will help ensure the appropriate regulation of copper in the future.

In particular, the law requires use of the 2007 USEPA Framework for Metals Risk Assessment, for evaluating the exposure and effects of metals on human health and the environment. This document was developed with the support of both the regulatory and regulated communities and represents the culmination of many years of scientific research on metals, much of which was sponsored by the International Copper Association and/or the other metals associations with whom the HESD program works closely.

Though these metals provisions are an important first step on the road to enforcement of "the new TSCA," the next three to five years will focus on significant USEPA rulemakings to further translate the new law into implementable policies. The HESD team in North America will be working closely with the NAMC as well as the Copper and Brass Fabricators Council to ensure the copper industry is adequately represented and takes full advantage of these important opportunities to further shape the future of chemicals management in the U.S.

Tracking the constantly shifting landscape of regulations across the 50 states ... is a daunting task.

COPPER: CRITICAL TO SUSTAINABLE DEVELOPMENT

In September 2015 the United Nations adopted a series of Sustainable Development Goals (SDGs). These 17 SDGs provide a framework to address mankind's most critical issues over the next 15 years and to ensure the long-term sustainability of the planet and its seven-billion inhabitants. There is a growing recognition about the critical role the private sector must play in tackling these complex issues, as evidenced by SDG17: "Partnerships for the Goals." No single stakeholder group can effectively address these challenges; governments, the UN and industry all need to collaborate if sustained progress is to be made.

ICA conducted an audit of its programs against the UN SDGs, and the audit shows that through ICA's programs the copper industry is making a positive impact on all 17 SDGs. No other material aligns as closely with the global sustainable-development agenda.

While this audit provides powerful evidence that Copper Makes the World Work Better, the driving force behind the audit was building and expanding partnerships to scale up ICA's work. Through partnerships like United for Efficiency (U4E, united4efficiency.org), ICA can leverage investments in areas such as energy efficiency with other organizations to expand ICA's programs and geographic footprint. This is possible because of the credibility ICA has built over many years with hundreds of organizations around the world.

No other material aligns as closely with the global sustainable-development agenda.

ICA can leverage investments in areas such as energy efficiency with other organizations to expand ICA's programs and geographic footprint.

Partnerships around the SDGs also have the potential to augment ICA's work in newer technologies with limited budgets. Examples include Antimicrobial Copper® and copper in aquaculture, where ICA-funded technology development has shown promise for new end-use markets. Each of these copper technologies align with multiple SDGs, and partnerships are being pursued actively. Electrical safety is another area where the potential to expand ICA's work alongside other organizations exists.

In 2016 ICA developed a paper outlining the programmatic alignment with the specific SDGs and published a brochure to facilitate discussions with potential partners. Electronic and printed copies of the brochure are available to members upon request. ICA also reorganized the website, sustainablecopper.org, to better align with the UN SDGs. Top-level messages on copper and sustainable development can be found at the microsite, copperalliance.org/app (also recommended for use on smart phones and tablets).

ICA encourages members to integrate messaging on copper's critical role in sustainable development—and the copper industry's commitment to advancing sustainable-development goals—in their own communications efforts.

COPPER AND THE 21ST CENTURY TRANSITION

The transition to greater energy efficiency and the use of renewable energy are global challenges. Some regions appear to be ahead of the curve when it comes to changing their policies and setting regulations. One region in particular, Europe, is leading the way in energy sustainability, and the European Copper Institute (ECI) is leading through the Leonardo Energy initiative, helping explain how copper enables this energy transition.

Leonardo Energy is showing regulators that copper is "the metal of the energy transition." Copper is required to move from low efficiency and conventional generation to energy-efficiency electrification and renewables.

Two recent scenarios have been constructed, which analyze what a 100 percent renewable energy infrastructure might look like in the year 2050—one from the European Union, one from Greenpeace. Although there are some differences in the generation profile, the conclusion for copper is clear.

Using the scenarios, ECI has calculated the 21st Century energy infrastructure will require 16 – 18 million tonnes of copper in addition to the currently installed base of 50 million tonnes. A key reason for this is the much higher copper intensity of use for renewable systems compared with conventional generation sources, e.g., offshore wind requires 10 times the amount of copper per MW than does nuclear energy.

In addition to these increasing uses of copper in the power network, end-use applications are also becoming increasingly copper intensive—electromobility, home automation, heat pump technologies to name three—are highly copper intensive 21st century energy applications.

Of these, electromobility shows the biggest potential in Europe. Electric vehicles will have a significant impact on copper usage due to the copper intensities in the vehicles themselves as well as the needed charging infrastructure. A battery electric vehicle, i.e., a fully electric vehicle, has three to four times more copper than a vehicle with an internal combustion engine, significantly increasing copper demand per unit.

... The International Copper Association and its Copper Alliance partners are ready to guide members through a transition that should be as positive for the copper industry as it is for society.

Meeting this increased demand will not be a problem, according to the U.S. Geological Survey (USGS). Copper reserves amount to 690 million tonnes (USGS, 2014), while copper resources are estimated to exceed 5,000 million tonnes (USGS, 2014). These numbers do not include vast copper deposits found in deep sea nodules and submarine massive sulfides.

The energy transition is in progress and irreversible. It's not a matter of how far but how fast we will go. Renewables, electricity networks and electric vehicles are the top three opportunities. Undoubtedly, the transition will also present challenges that will need to be managed. Through alliance building, advocacy, standardization, market intelligence and innovation, the International Copper Association and its Copper Alliance® partners are ready to guide members through a transition that should be as positive for the copper industry as it is for society.

International Copper Association

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