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ICOLD President

Foreword to the ICOLD World Declaration on Dam Safety

CONTENTS:

Editorial

ICOLD Feature

Successes and Failures of Energy Transitions **P.3**

The results of the German Laboratory **P.5**

“By 2023 at the latest, we will be running into a shortfall in secure capacity” **P.6**

From Costa Rica to Iceland, Hydropower countries are showing the way **P.7**

ICOLD News

Four questions to Devendra Kumar Sharma **P.9**

AFRICA 2019 focuses on collaboration for water, energy and food security **P.14**

A Resounding Success for ICOLD Annual Meeting in Ottawa **P.15**

Main decisions taken during the General Assembly **P.16**

15th ICOLD Benchmark Workshop **P.17**

Board meetings in Porto and Denver **P.18**

ICOLD Activities **P.20**

The position of President of the International Commission on Large Dams (ICOLD/CIGB) is a great honor bringing great responsibility and tremendous opportunity to lead our historical commission of nations into the future. In my opinion, ICOLD with our legacy of collaboration and familial gatherings represents the best of humanity in a worldwide infrastructure industry that provides basic human needs of clean water, renewable power and life-saving flood protection. Since our founding in 1928, the tens-of-thousands of men and women have worked tirelessly as a global community under the ICOLD banner for essentially a single purpose – Dam Safety.

As hard as we have worked, however, each year many dams fail under normal and extreme conditions. As ICOLD President since my election on July 3, 2018, there have been several large dam incidents and failures that have endangered thousands and killed hundreds of people. The situation of dam failures should never be accepted as a regular occurrence based on historical probability and recognized risk. Rather, it should be a challenge and sacred commitment from each professional in the industry of dams and hydropower to work toward safer dams for the betterment of humanity. ICOLD must stay committed to continuous improvement in the safety of dams and levees as our highest calling to serve humanity with critical infrastructure while

at the same time protecting humanity from the failure or misoperation of those same structures.

As I made my first speech as ICOLD President at our Congress in Vienna in July 2018, I committed myself and the Board of Directors to a renewed organizational commitment to Dam Safety as the top priority of improvement for ICOLD that I would provide leadership during my three-year term. At my first Board meeting as ICOLD President in New Delhi in October 2018, I asked Vice President Michel Lino (France) to take the lead on the development of a new ICOLD World Declaration on Dam Safety working with Hon. Vice President Andy Zielinski (Canada) – Chairman of ICOLD Committee H – Dam Safety and Secretary General Michel de Vivo (Central Office). After nearly nine months of hard work, I was honored to present the Draft Declaration at the 87th Annual ICOLD Meeting in Ottawa earlier this year.

Following the Ottawa meeting, the Draft Declaration was sent to all 101 ICOLD National Committees for review and comment, as well as a second review by the World Bank in an effort for inclusion of this key worldwide stakeholder for dam safety. All comments were received by the ICOLD Central Office and a draft-final Declaration was presented to the ICOLD Board members for any additional input and insights. Based on the input from the ICOLD Board and National Committees



World declaration on Dam Safety.



Editorial

as well as the World Bank, a final version of the ICOLD World Declaration on Dam Safety was approved by the ICOLD Board of Directors at our regular Board Meeting in Porto, Portugal on October 17, 2019. It is with great pleasure that I present the approved Declaration in this ICOLD Newsletter.

There are many things that each of us can do every day in our work as we provide service for the planning, design, construction and operation of dams and levees. We must stay aware of our aging infrastructure as well as recent advancements documented in our ICOLD Bulletins that are freely available to all members. As an industry, we are seeing the results of our aging infrastructure and an aging cadre of senior dam design experts and technicians. These conditions are both a threat and an opportunity to our younger colleagues of our dams and hydropower profession. The maintenance of what we have already built and the continued development of new infrastructure to meet the demands of a growing world population challenge all of us and offer great opportunity. For each of us – young and old - there are teachers and mentors in our lives that offer precious learning to those who have the strength to seek knowledge.

It is my hope that this new ICOLD World Declaration will provide a renewed commitment to Dam Safety by each individual as part of all 101 ICOLD National Committees. To support this Declaration, ICOLD has many resources freely available to our members. ICOLD is proud to be an organization offering our knowledge to the world without regard to economic standing, race or creed. Founded 91 years ago as a nongovernmental organization, ICOLD was envisioned by our founders for the open exchange of knowledge and passion for dam engineering. The purpose of this exchange was the purest form of goodwill that all individuals

in all countries may learn from each other the technical science and art of safely designing, building, maintaining and operating large dams. This mission has only grown wider as each individual country has joined ICOLD bringing their experience and professional energy to our broad mix of professionals. This mission has also grown more important as the numbers of dams of all sizes continue to grow, especially in developing countries dependent on this infrastructure to secure peace and prosperity for its citizens.

Truly, the camaraderie of ICOLD nations and individuals have greatly contributed to the safe design and construction of some of our world's most important infrastructure – large and small structures located in nations large and small. As ICOLD President and a dam engineer, I continue to believe that it is only in openly sharing our lessons – good and bad - that we truly learn. And, it is in learning that we as engineers, managers, ministers and other professionals are better able to serve our fellow members of humanity who have their lives improved with the clean water, renewable and sustainable electricity, critical flood protection and many other benefits of dams and hydropower projects.

ICOLD as an organization carries a strong commitment to a harmonious collaboration on a global scale to our profession of dams and hydropower. It is refreshing as members of a profession boldly committed to improving and protecting lives, that we lean into a world of political and physical conflicts to rise above the fray in order to care for each other through technology and heartfelt friendships. Please read this Declaration and share it openly. It is my hope and prayer that this ICOLD World Declaration on Dam Safety saves lives through a renewed commitment on a global organizational level for our commission of nations.



Successes and Failures of Energy Transitions

by Emmanuel Grenier

Energy Transition is a subject which is on the table since more than 25 years, with the 1992 Rio Summit and the UN Framework Convention on Climate Change which was signed there. Since that time, there has been a massive increase in new renewable energies like wind and solar. The dam opponents promoted these new energies as a universal solution. Did they deliver?

Climate change and limited fossil fuels resources have led to question our energy policies worldwide. There are many initiatives now aiming at reducing carbon emissions, saving energy and promoting the carbon-free modes of electricity production. All these are grouped under the code name "Energy Transition". The investments in renewable energy have increased tremendously during the last 20 years. According to the Report "Global Trends in renewable Energy Investments", they are now superior to the investments in new fossil fuel power plants, reaching a maximum of \$312 billion in 2015, with an annual investment between \$230 and \$310 billion during the last decade.

Accordingly, the solar and wind electricity production capacity have quickly increased and became a significant part of the total capacity. In 2018, they represented 594 GW for the wind and 480 MW for the solar. A total of 1074 GW out of a global capacity of 7000 GW, nearly equivalent to the Hydropower contribution (1172 GW).

Spectacular growth

The International Energy Agency (IEA) predicts a large increase in the production capacity of electricity from renewable sources by 2024, driven mainly by photovoltaics and wind power.

In 2018, 26,556 terawatt hours (TWh) of electricity were produced worldwide, 26% of which came from renewable sources. This figure is expected to increase by 55% by 2040, according to IEA, which released its annual report, World energy outlook, on November 13. Photovoltaics and wind power would account for more than half of this growth in the scenario based on government energy targets. These two sources could provide more electricity than hydraulics by 2030. Photovoltaics would be the main driver, with 60% of the additional renewable electricity production capacity installed by 2024.

The IEA forecasts 1,200 GW of additional capacity for renewable energy by 2024, the equivalent of the total capacity of the United States today. Photovoltaic solar (PV) is expected to experience "spectacular" growth, brought to 75% by distributed systems (installations on the roofs of houses, commercial and industrial buildings, as opposed to photovoltaic power plants on the ground). The installed capacity of distributed PV could more than double by 2024 to 530 GW. In particular thanks to China, which should overtake the European Union in 2021 and impose itself in this area.

Huge capacity for a weak production

But this tremendous increase of the production capacity of wind and solar energy has led to a modest increase of the production. Together, those two energies make 15.3% of the installed capacities but are contributing only 6.2% of the power produced (figures are from Renewable Statistics 2019, produced by the International Renewable Energy Agency).

This difference is easily explained: for the solar, the so-called capacity is in fact a theoretical maximum production (peak power corresponding to the maximum sunlighting, which never takes place. This is the same thing for wind power, whose capacity corresponds to the optimal wind situation.

Both solar and wind energies are depending on nature and are intermittent. This is not a problem as long as they represent a minor share in the regional or national production. It is very different as soon as the share reaches 40% of the power produced.

Since the Energy transition policies are often aiming at reaching a 100% share, it is wise to consider the situation in the countries which are most advanced.

We will see first, the case of the German "Energiewende", presented as a model by the green activists. Germany has a renewable share of 20%. It is the same for Portugal, Spain, Eire and Greece.



📌 Hundreds of thousands of windmills like these have been installed throughout the world during the last decade. The global capacity has reached 591 GW at the end of 2018. If the wind conditions were always at the top, the wind would produce 5177 TWh. But the actual production was limited to 1117 TWh in 2018. That is a load factor of 21.5%. Hence the importance of well differentiating capacity and production!

••• But we will study Germany, because it is the country where the data are the most complete and detailed. Then, we will study the case of Southern Australia.

Is Germany an example for the world?

The German Energy Transition (Energiewende) is promoting decentralized energy production and is concentrating most of its investments in solar and wind energy.

Since 2012, the Climate Performance Index is published every year by Climate Action Network Europe (Greenpeace, WWF, ...); it is an index measuring the efforts of different nations in the fight against global warming.

The 2017 edition of the Index was a shock in Germany because it described a Germany that plummeted seven places. The weekly Die Zeit noted: "India is doing better than us", and the Frankfurter Allgemeine Zeitung added: we are "behind Egypt and Indonesia". After more than ten years of Energiewende, the German energy sector emitted as much greenhouse gas for a given consumption as in 2005.

And this poor result came at a high price.

From 1990 to 2005, therefore before the effects of the Energiewende:

Greenhouse gas emissions per unit of energy consumed decreased by 16.6% in fifteen years, or about 1% per year. Roughly speaking, it's the average pace of the European Union. The study

of the variation of the energy mix shows that three causes explain this decrease in emissions. The first two are notable, but minor, an expansion of nuclear, which does not emit greenhouse gases, as well as the growth of a renewable source, biomass. The most important cause is the partial replacement of coal with gas, which is much less polluting.

From 2005 to 2014, during the Energiewende:

A huge surprise: the rate of decline in emissions not only was not increased by the energy transition policy, but was stopped! These emissions per unit of energy were even slightly higher in 2014 compared to 2005.

There are two reasons for this: the decline in nuclear production, but especially the end of the replacement of coal with gas. The expansion of solar and wind is real ... but in electricity only. The electricity sector in Germany, accounts for only one-fifth of the total energy sector.

The situation has slightly improved after 2014 but the rate of decline in emissions per unit of energy remains much lower than before the implementation of the energy transition.

This very relative and very insufficient improvement is not due to solar and wind energy whose share in electricity stagnated in 2016 compared to 2015, but to a shift of coal consumption towards gas.

The period corresponding to the Energiewende is catastrophic for the fight against global warming. •



Press Release
5. September 2019

Energiewende-Index von McKinsey: Deutschland droht Versorgungsengpass

The September 2019, McKinsey report on Germany created a shock in the country, as reflected by this article from one of the main dailies of the country: Die Welt. The title is clear : "After 8 years of Energiewende, we now have a problem of power-supply."

The results of the German Laboratory.

The basic ideas of the German energy transition -- focus on the electricity sector, investments focused on solar and wind energy, decentralization of energy production -- are the subject of great enthusiasm in the Green movement.

For example, Lori Pottinger, who served International Rivers for 20 years working against dam construction in developing countries, is a strong supporter of Energiewende, like most of the anti-dam activists throughout the world.

However, the German Laboratory makes some disturbing cracks. The Minister in charge of Energiewende, Sigmar Gabriel, said in 2014: "The truth is that we have underestimated the complexity of the energy transition in all its aspects". Five years later, the observation remains the same. Electricity tariffs for households are rising again and it is necessary to subsidize the German industry to the tune of nearly four billion euros per year to avoid that the bill of renewable energy cripples its competitiveness. It is striking to note the little impact on the energy mix after fifteen years of a proactive transition policy focused on electricity and the wind-solar couple, including heavy investments and massive subsidies.

However, collateral damage is real. Wholesale prices in the electricity market are falling and consumer prices are rising. To top it off, greenhouse gas emissions relative to energy consumption have not dropped over the past twelve years.

Consulting giant McKinsey devoted a full report on this question, that was issued in September 2019. It concludes that Energiewende poses a significant threat to the nation's economy and energy supply.

One of Germany's largest newspapers, Die Welt, summarized the findings of the McKinsey report in a single word: "disastrous." "Problems are manifesting in all three dimensions of the energy industry triangle: climate protection, the security of supply and economic efficiency," writes McKinsey. In 2018, Germany produced 866 million metric tons of carbon dioxide, a far cry from its goal of 750 million tons by 2020.



Despite much hype, Germany still generates just 35% of its electricity from renewables. And if biomass burning, often dirtier than coal, is excluded, wind, water and solar electricity in Germany accounted for just 27% of electricity generation in 2018.

But McKinsey issues its strongest warning when it comes to Germany's increasingly insecure energy supply due to its heavy reliance on intermittent solar and wind. For three days in June 2019, the electricity grid came close to black-outs. "Only short-term imports from neighboring countries were able to stabilize the grid," the consultancy notes.

As a result of Germany's energy supply shortage, the highest observed cost of short-term "balancing energy" skyrocketed from €64 in 2017 to €37,856 in 2019. "It can be assumed that security of supply will continue to worsen in the future," says McKinsey.

Renewables are causing similarly high price shocks in other parts of the world including Texas, Australia, and California. And Great Britain and Australia have faced similar energy supply problems in recent years as they have attempted to transition to intermittent renewables.

Australia electricity regulators in August sued four wind farm operators for contributing to a huge blackout in 2016.



“By 2023 at the latest, we will be running into a shortfall in secure capacity”

Bloomberg News, called the supply problems a "warning shot to the rest of the world." "We have to have systems in place to make sure we still have enough generation on the grid -- or else, in the best case, we have a blackout, and in the worst case, we have some kind of grid collapse," Severin Borenstein, a University of California energy economist told Bloomberg.

German utilities too are warning of insecure supply. "By 2023 at the latest, we will be running with eyes wide open into a shortfall in secure capacity," a managing director for the Germany energy industry association BDEW said.

"The ongoing phase-out of nuclear power by the end of 2022 and the planned coal withdrawal will successively shut down further secured capacity," explained McKinsey. "In particular, the industrial regions in western and southern Germany are affected, in which many capacities go off the grid and at the same time, one can not expect high rates of development of renewables."

The growing insecurity of German energy supply is made worse by the fact that its neighbors Belgium and Netherlands may shut down baseload capacity: coal plants in the Netherlands and nuclear plants in Belgium.

As such, McKinsey worries that Germany may not be able to meet demand with imports. "In the medium term, there is a risk that there will not be enough supply capacity in the entire European network."

That could happen as soon as five years from now. "Without adequate expansion, the first bottlenecks could occur as early as the middle of the next decade, and they will continue to worsen until 2030."

William D. Magwood (OECD), referring to the European situation, said bluntly: "the markets are broken; they don't work and don't do what they are supposed to do. The time has come to recognize that we have a situation where large utilities are losing money and are almost on the verge of bankruptcy. When you have a situation in many markets where the only things that can be built are things that are subsidized, then we have a serious problem."

But Germany could have endured much more severe consequences, save its connections to the neighboring countries France, Switzerland and Sweden. The case of South Australia shows what could have happen.

German consumers have paid dearly for the energy transition. German electricity prices are 45% above the European average, McKinsey reports. Green taxes account for 54% of household electricity prices.

Electricity prices will continue to rise through 2030, McKinsey predicts, despite promises in recent years by renewable energy advocates and German politicians that they would go down.

South Australia is a state from the Australian Federation, with a huge territory and a small population. Without being constrained by space, wind and solar energy were developed intensely. This led to a strong production from wind and solar but also to the highest prices for power in the world.

During the Summer 2016, four blackouts took place, the worse one on September 28, when a tempest led to repeated stoppings of wind farms, then to a cascading failure of the electricity transmission network which resulted in almost the entire state losing its electricity supply.

A new insurer job for utilities

What happened in South Australia leads to the following conclusion:

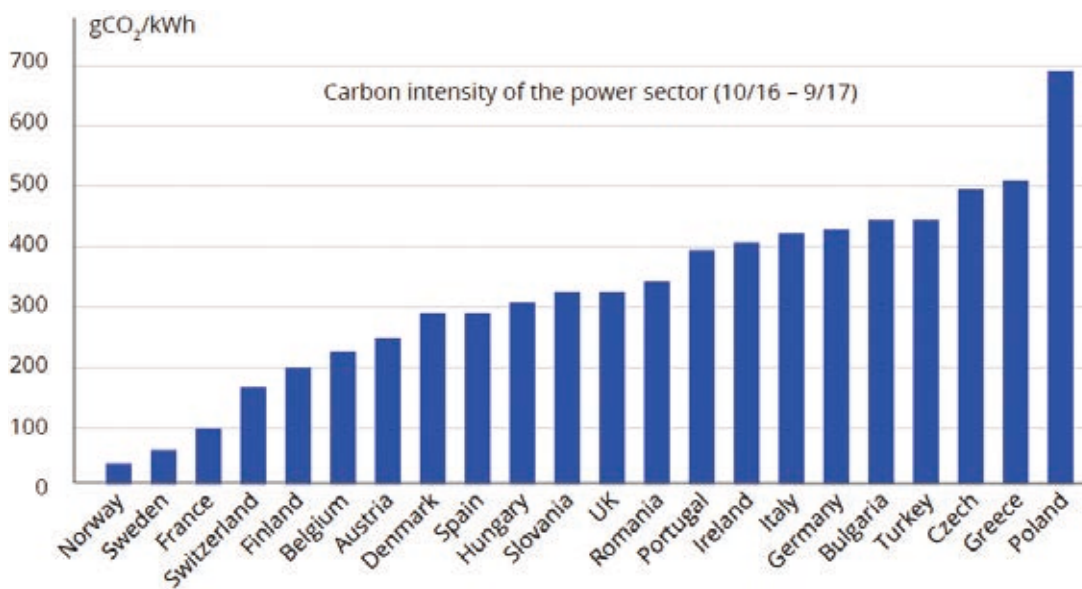
The producers of non-intermittent electricity are playing two separate roles. First, their usual job, to produce power; second, to compensate the irregularity of the wind and solar power. This function is new and is more related to an insurer job. The price for the backup kWh is much higher than the usual price. In Europe, the classical utilities are delivering this insurance without being paid for. That's the reason for their bad financial situation, leading to the closure of plants.

With South Australia, we have a first approximation of the order of magnitude of this insurance policy that's the cost of the urgency plan adopted by the South Australia Government after the series of blackout : \$448 million corresponding to a 250 MW gaz turbine and a \$123 million batteries park.

All this does not mean that wind and solar energies do not have a brilliant future. Of course, they have one. But it means that the dream of the anti-dam environmentalists of a power delivered 100% by wind and sun is still a dream.

The reality is that wind and solar are viable only when they are coming as a supplement to hydro-power (see p. 7-8).

From Costa Rica to Iceland, Hydropower countries are showing the way



As shown on these data on European countries, using the last known figures from 2016, all the leading countries from the standpoint of carbon emissions in the power sector are relying mainly on hydropower. There is one major exception with the case of France, which is relying on nuclear power but which has also a strong hydro component.

That is for the negative side. On the positive side, we have countries which are nearing the 100% renewable, carbon-free power generation. We will see the examples of Costa Rica, Iceland and Portugal.

Costa Rica is a small country which is now nearing the moment when it produces 100% of its electricity without emitting carbon in the atmosphere. Already in 2019, the country has generated more than 99% of its energy from renewable resources, despite the dry conditions that have prevailed in the region and hindered the hydropower production.

In 2019, Costa Rica has generated 67.5% of its energy from hydropower, 17% from wind, 13.5% from geothermal sources and 0.84% from biomass and solar panels. The remaining 1.16% corresponds to backup plants, based on fossil fuels.

Here, when the wind blows, water stored in the reservoir is saved for being used later, when there is no more wind. But contrary to the case of Germany, there is no obligation of buying power from wind

mills or solar cells. Electricity in Costa Rica has not been deregulated despite pressures from IMF. The Instituto Costarricense de Electricidad (Costa Rican Electricity Institute, ICE) was created in 1949 and has developed one of the world's most sustainable, efficient and equitable electricity systems. Costa Rica has the highest coverage of electricity services in Latin America. Since its creation, the ICE has expanded access from 14% in 1949 to more than 99% at present.

In 2009, the national consumption of electricity totaled 8,238 GW, of which ICE provided 40%; CNFL—an ICE subsidiary—contributed another 40%, and the cooperatives and municipal companies were in charge of the remaining 20%. In terms of geographic coverage, ICE was responsible for the provision of electricity in 78% of the national territory.

The Costa Rican government says its clean energy generation — which powers more than 1.5 million homes and 225,000 businesses — has saved the



Costa Rican Reventazon hydroelectric dam (305 MW) is the second biggest infrastructure project in Central America after the Panama Canal and the largest of its kind in the region. This dam is a living example of the lies propagated by the Oxford Said Business School economists about dams: The cost of the project by the Instituto Costarricense de Electricidad (ICE), the State power company, came at only US\$1.4 billion dollars and it was completed three months ahead of schedule.

country nearly \$500 million over the past 20 years over relying on fossil fuels.

"This achievement is the result of the planning and optimization of resources of the national matrix, which protects its regulatory reservoirs in dry periods – like the one just faced – while increasing the geothermal quota," said ICE in a statement.

In June 2019, Costa Rica opened a brand-new geothermal plant, the country's seventh, with a projected annual generation of 410 gigawatt hours. The country's drive to harness the power contained in volcanic steam will mitigate its dependence on hydropower. Costa Rica is now the third-largest producer of geothermal power in the Americas.

An easy result for a country rich in hydroelectric resources?

Some may devalue Costa Rica's results by pointing out that nature has endowed it particularly well with an important hydropower potential. It would be neglecting the political will required to get there, and the fact that many other countries are equally well-endowed but have taken the easy route of dependence on polluting energies.

Monica Araya, the founder of renewable energy initiative group Costa Rica Limpia, said : "It's not just luck, it's also a capacity for long-term thinking. (...) The story could have been different: it could have been the story of any developing country that chooses the short-term option."

The same can be said about Iceland, which meets all its electricity needs from environmentally friendly renewables: The share of renewables in the production of electricity in Iceland is the highest in the world, according to figures from the International

Energy Agency IEA (see Box : hydropower countries are showing the way). Iceland meets 99.99% of its electricity needs with renewable energy. Virtually all of this comes from hydropower, 71.03% and geothermal, 28.91%. Wind power generates 0.04% of the electricity. Fossil fuels come a distant fourth, with only 0.01% of the energy production.

In Portugal, there was a strong mobilization to develop hydropower and wind energy during the first decade of the millennium and the country is now planning to develop solar power. The results of this policy, where intermittent are working with hydropower rather than against, are already here. Electricity production from renewable sources provided 51% of national consumption in 2019, wind power representing 27%, the highest share ever recorded, according to REN - Redes Energéticas Nacional. According to REN data, in 2019, renewable production provided 51% of national electricity consumption in 2019, the wind representing 27% of consumption, the highest share ever recorded for this technology, hydropower 17%, 5.5% biomass and 2.1% photovoltaic. The relatively weak figure for hydro is explained by the very strong drought affecting Western Europe and specially the Mediterranean zone.

Ren is trumpeting that "there was a period of 131 consecutive hours between December 18 and 23, during which renewable production exceeded consumption".

Thus, in December 2019, total renewable production provided 76% of national consumption (including the balance of exports) and non-renewable production the remaining 24%.

In fact, as exemplified on the figure p.7 all the countries which have a strongly decarbonated energy mix for producing electricity are relying heavily on hydropower, using solar and hydro as a complement. Those who chose to rely mainly on wind and solar are far behind.

Wind and Solar energies are excellent when they come as a way to spare fossil fuel (in coal or gas power plants) or water (in hydropower plants). One good way to expand the use of solar energy is to associate it with a pumping storage plant. Hydro storage provides reliability and flexibility to a renewables-based grid by creating a huge, continuously rechargeable battery that is entirely powered by the elements: All you need are healthy solar and wind power capacity, some water and the means to pump it uphill. According to François Lempérière, it is the future of energy and he estimates that in 2050, there will be more dams built for pumping storage operations than classical dams associated with a single reservoir. ●



Before the 88th Annual Meeting in New Delhi



Four questions

to Devendra Kumar Sharma



Devendra Kumar Sharma, Vice President, ICOLD & President, INCOLD & Chairman Bhakra Beas Management Board

1. Why did the Indian Committee choose to candidate for hosting an ICOLD annual meeting ?

• India is the 2nd most populous country after China. With a population of 1.3 billion people, India is home to nearly 16 percent of the world's population though it has only 4% of the world's water resources. A major share of the 690 billion cubic meter of available surface water still needs to be harnessed to fulfil future demands of its people. The country experiences extreme variations in rainfall, temporarily as well as spatially. Rainfall period during monsoons in most parts of India is about 100 hours only, necessitating the construction of dams for storage of water to meet the requirement of water for various purposes like drinking water, irrigation, hydropower generation, environmental releases to protect aquatic eco systems besides industrial needs.

• Out of 36,000 large dams in the world, India has about 5,264 large dams as per ICOLD criteria, which helps in storing about 300 billion cubic meter as annual live storage. About 450 dams are under construction and many more dams are envisaged in the near future. In many cases, peculiar geological as well as other challenging issues are of relevance to dam community.

• We are proud to initiate massive programme entailing Interlinking of Rivers. This will help long distance water transfer with storage dams and associate structures. Over 30 dams, and long canal systems exceeding 10,000 km would boost opportunities to utilize about 200 billion cubic meter of water additionally per annum.

• In addition, out of 150,000 MW hydropower potential, only 48,000 MW has been developed so far. The remaining majority of the hydropower potential available is in Himalayan region and yet to be developed in the complex geological formation. It would not be out of place to mention some of the significantly world's largest dams exceeding 300m are being contemplated in the Himalayas. Indian

dam and hydropower owners are looking forward for interaction and the expert's advice from the global dam and hydropower professionals and construction groups about the latest technologies for development of balance hydropower potential.

• In view of the above, Indian Committee on Large Dams (INCOLD) is delighted to host the 88th ICOLD Annual Meeting in April 2020 at New Delhi. The technical tours to some of the major dam projects of importance in different regions along with touristic attractions would assure the visit of delegates insightful, enjoyable and memorable.

2. What are the benefits expected from this ICOLD 2020 meeting for Indian dam professionals and companies?

• The ICOLD 2020 event will provide an excellent opportunity to Indian dam engineering professionals and agencies to share their experiences, ideas and latest developments in new materials and construction technologies, advancement in investigation techniques, best engineering practices, dam safety issues etc. It is not often that our professionals get the chance to networking with the world renowned dam experts from different countries and organizations involved in dam construction, management and operation and maintenance for mutual benefits.

• The Indian Government and companies welcome this opportunity to show case the successful implementation of the World Bank financed '**Dam Rehabilitation and Improvement Project (DRIP)**' to the world dam community. This project will improve the safety and operational performance of large dams and its appurtenances structures. In addition, we would be delighted to share the institutional strengthening and National Hydrology Project (NHP) for modernization of new and existing hydro-met monitoring systems including meteorology, stream flow, ground water, water quality, water storage measurements and construction of hydro-informatics centres that capture both water resources and uses.

• ICOLD 2020 will also be a unique opportunity for the India Government organizations and

continued on page p.12



World declaration on Dam Safety

The construction, operation and maintenance of dams and their storage reservoirs have provided significant benefits to humankind throughout history. Storage of water behind dams regulates natural streamflow, provides benefits resulting from increased water availability, renewable energy production and reduction of adverse impacts caused by nature's extremes of flooding and drought. This document addresses the importance of the dam safety, which encompasses water dams, mining tailings dams and levees.

Growing population in our fragile world is causing steady increases in demand for water, food, energy, minerals and flood control. **Dams are critical infrastructure to meet these basic human needs as well as rising standards of living.** At the same time, however, dams create new hazards involving potential risks to downstream communities, including potential adverse impacts on life, property and the environment. The potential for dam safety incidents, possibly resulting in an uncontrolled or catastrophic release of stored water is of the highest concern.

The profession of dam engineering has a profound ethical responsibility to carry out its professional duties so that dams and reservoirs are designed, constructed and operated in the most effective and sustainable way, while also ensuring that both new and existing dams are safe during their entire lifespan, from construction to decommissioning.

Dams in operation has been reduced significantly, which is a positive achievement that reflects the worldwide influence of ICOLD in raising dam design and management standards. Nonetheless, constant vigilance and commitment to dam safety is still required in order to continue the global trend towards safer dams. Any dam incident is a matter of the gravest concern for dam professionals. **It is our ICOLD Declaration that Dam Safety is our highest priority.**

Changing Conditions of Dam Safety

Due to the vital need for water, food, energy, minerals and flood control, the total number of dams worldwide continues to grow. Maintaining the present trend of a decreasing incidence of dam failure is a never-ending challenge for the profession. ICOLD's role in knowledge transfer and capacity building through the dissemination of the best practices is as pertinent as ever. The science, technology and human roles in dam safety are in constant evolution with many changing conditions:

- **Ageing of existing infrastructure**, creating new concerns related to the longevity of construction material and equipment, including infilling of reservoirs with sedimentation.

- **Lack of experience in dam safety management and operations** in some countries engaged in building dams, requiring the need for capacity building.

safety that have been learned over time. Furthermore, all involved entities should be reminded to ensure, through the fulfillment of their responsibilities, that these fundamentals are respected in order to minimize risks associated with dams and reservoirs.

Pillars of Dam Safety

With almost a century of commitment to dam safety, and knowing that the zero risk does not exist, ICOLD recognizes several overarching pillars of dam safety:

- **Structural integrity of dams is the keystone to dam safety.** Best current practices of dam design and performance during the occurrence of hazardous events such as extreme floods and earthquakes have been largely documented by ICOLD bulletins in order to create a sound basis on which existing and future dam structures should be designed, built and operated in safe conditions.

- **A routine surveillance and maintenance programme is necessary for early detection.** Inspection and upkeep are of high importance to minimize the risk and to ensure dam safety in the long term. Periodic safety review by qualified engineers that are highly experienced in dam safety assessment is mandatory. Supervision of dams should be based on both the operator's self-supervision and periodic external safety reviews by an independent and competent authority or institution.

- **An instrumentation and monitoring programme is essential throughout the**



training and understanding of their dam. Mis-operation of a dam, especially of spillway gates, can lead to accidents, downstream flooding or potential overtopping of the dam.

- **Sharing lessons learned benefits the entire industry, making all dams safer.** The experience of ICOLD has shown that sharing lessons from dam incidents and failures is crucial to improve state-of-the-art practices. For all involved parties, it is thus imperative that any documentation on dam incidents, including independent expert reports on the root causes of such incidents, be made freely accessible to the international community.

- **A comprehensive dam safety approach will allow minimization of risks.** This is done through collaboration of national organizations to support dam safety: structural measures for strengthening the structure's integrity and stability; measures to minimize the consequences of failures as well as education and public awareness about dams. A comprehensive dam safety approach should also consider the fact that river-basins, many of which are transboundary basins, often include several dams, or systems of dams and levees.

- **A dam owner has the ultimate responsibility for its dam.** ICOLD recognizes that the safety of all dams is primarily the responsibility and liability of owners and operators. Adequate personnel and financial resources as well as relevant know-how are essential conditions to meet this responsibility.

- **The role of regulatory authorities is paramount for safety.** Regulatory authorities

ICOLD and Dam Safety

For almost a century, the International Commission on Large Dams (ICOLD) has made dam safety one of its highest organizational commitments, as stated in the ICOLD Mission statement:

«ICOLD leads the profession in setting standards and establishing guidelines to ensure that dams are built and operated safely, efficiently, economically, and are environmentally sustainable and socially equitable.»

Before the creation of ICOLD in 1928, knowledge on dam safety was disparate, while the need for building water storage infrastructure was very high and growing. It therefore became a priority of ICOLD to disseminate the understanding of the design and operation of dams based on experience within the global dam engineering community. And along with this dissemination came a strong focus on dam safety that has permeated up to the modern era.

ICOLD has played a key role in improving dam safety through its work in collecting and analyzing information on the lessons learned from past successes and failures. Since the very beginning, ICOLD and its thousands of professionals within the member countries have continuously contributed to the improvement of dam safety through publication of technical papers and exchange of experience during Annual Meetings and Congresses. ICOLD's Technical Committees develop Bulletins for publication that summarize the current state of the practice.

Since the creation of ICOLD, the number of failures compared to the total number of

■ **Retirement of experienced personnel** in all countries, leading to a deficiency in qualified engineers trained in dam design.

■ **Increasing participation of the private sector** in the development of dams as well as increasing cost and time pressure on developers, designers, contractors and operators, creating a need for new governance conditions for dam safety.

■ **Climate change causes changes in extreme precipitation** and drought events, resulting in increased hydrological risks. It is critical to consider changes in climate during planning and management, including resilient design and adaptive reservoir operation of dams. In some regions, this results in a need to increase the height of dams, expand spillway capacity, modify reservoir operating procedures, and/or construct new dams. There may also be a need to assess and address other hazards created by climate change as part of the planning, design and operational phases.

■ **The most suitable sites for dams have largely been utilized**, thus new dams must be built in more and more challenging locations, especially regarding geological conditions.

■ **Changing local, regional and national governance** can have a significant impact in regulatory authority for dams.

As a recognized international organization of experts in dam engineering, ICOLD calls upon governmental authorities and financing institutions to promote an awareness of the subject of Dam Safety. **The goal of this ICOLD World declaration on Dam Safety is to restate the fundamentals of dam**

life of a dam. A comprehensive dam monitoring programme is necessary to: a) determine behavior during construction; b) assess performance during first reservoir filling; c) compare actual performance with design; d) characterize long-term behavior; e) provide early warning of abnormal conditions; f) capture & analyze response to events, such as large floods, earthquakes, etc.; g) predict future performance of dam; and h) demonstrate safe management of the dam to regulatory authorities.

■ **Design-Intrinsic risks need to be adequately addressed.** These risks are based on dam type, materials, ageing, foundations, hydraulic structures, etc., in which good practices and surveillance are the keys for safety.

■ **Natural hazard risks change with time, thus should be regularly reviewed and updated.** These hazard risks like floods and earthquakes are external threats, for which risks are accepted based on known science and likelihood of occurrence.

■ **Emergency planning is of utmost importance for all dams.** Emergency plans should be developed with the objective of avoiding loss of life and reducing damage to property, infrastructure and the environment resulting from a dam failure. The first filling of the reservoir being a critical period during which the emergency plan must be ready for implementation in a timely manner. Periodic review, updates and practice of the emergency plan is mandatory.

■ **Adequate training of operators is part of a comprehensive dam safety programme.** Those placed in charge of dams bear an important responsibility to maintain their

should take a strong role in ensuring adequate site investigation, best practice design standards, quality construction, contractual frameworks, emergency preparedness and operational compliance within accepted guidelines and standards. Developing norms, standards and safeguards is a key factor to proper dam safety surveillance.

■ **An international perspective to dam safety can be enlightening.** International organizations such as ICOLD, which provide guidelines based on worldwide experience, can provide important guidance to designers, owners and government authorities to better understand the current state of best practices for design and safety of dams.

Summary Declaration

With the aspirational goal of working towards continuous reduction of dam safety incidents, ICOLD, as the leading international organization committed to dam safety, calls upon **all involved professionals and companies to make a firm commitment to safety improvements and risk reductions at all dams.**

Furthermore, **Governments, Financial Institutions and other Developers, in their contribution to the development and regulation of dam infrastructure, are called upon to make a similar political and financial commitment** so that the all-important safety recommendations for dams outlined in ICOLD Bulletins, will be disseminated to the relevant entities and followed to completion. **This common effort will contribute immeasurably to the overarching ICOLD vision:**

“Better Dams for a Better World”

Approved on October 18th 2019, in Porto.

International Commission On Large Dams





continued
from p.9

companies to show their strong presence in the activities of ICOLD and interaction with more international dam experts/professionals. Dam professionals of the country would get exposure and benefits therefrom.

- India is committed to ensure water, food and energy security, which is possible by creation of adequate storages for which more dams are required to be constructed. India also has to create adequate storage capacities to counter the impact of climate change associated risks.

- Leveraging expertise within ICOLD on global policy and standards, we invite discussion on the enactment of Dam Safety Bill 2019 passed in the Lok Sabha in the last session, in order to put regulatory mechanism in place to provide proper surveillance, inspection, operation and maintenance of dams in India. This bill is a big leap, to ensure their safe functioning and uniform dam safety procedures for national investment and benefits by safeguarding human life, livestock and property. It is in this context, we have to discuss global experiences where such mechanisms are already in place and about their experiences in implementation of such practices.

- Organising ICOLD2020 will inter-alia be beneficial to Indian engineers to meet the challenges of the 21st century in the development and management of the water and hydropower resources.

3. Young Dam engineers/Professionals:

- ICOLD 2020 will offer a unique learning opportunity for individuals from around the world who are in the early stages of their careers. Through specific events and initiatives targeted at these delegates, the ICOLD 2020 event integrates young professionals (age 35 and under) into all aspects of the program.

- ICOLD 2020 will also provide the best opportunity to young professionals from India who may not be able to attend the ICOLD events outside India, to interact with the World dam experts and to learn from their experiences for better management of our dams and also help in capacity building of our engineers in a big way.

- Young professionals are especially encouraged to attend ICOLD Technical Committee meetings and workshops, in addition to the Symposium and other events. It will provide them a unique opportunity to engage with technical subject matter experts from around the world and to participate in the development of leading practices. They can establish contacts with technical leaders and organizations at the forefront of dam engineering.

4. Some people in the West are reluctant to come: how do you plan to convince them to come to New Delhi?

- India is incredible, has a rich cultural heritage, is the World's oldest civilisation, is the largest democracy in the world, provides unmatched courtesy and hospitality. It focuses on dynamic development of the liberalized economy. India is a sovereign, socialist, secular, democratic Republic, with a parliamentary system of Government. The complexity and variety is the hallmark of India, which attracts many visitors. India is invincibly rich in art and culture. The beauty of the Indian people lies in the spirit of tolerance, give-and-take and a composition of cultures that can be compared to a garden of flowers of various colours and shades maintaining their own entity, lend harmony and beauty to the garden - India!

- India Expo Mart in NOIDA, adjoining New Delhi where ICOLD 2020 is being organised has lot of green cover. Air Quality in New Delhi during the ICOLD 2020 in the month of April will be good, based on historical AQI data. Even air purifiers have now been installed in New Delhi.

- INCOLD has designed a comprehensive technical program on the current practice of Dam Engineering and Water Resource Management and for safe operation of dams during the ICOLD 2020 event at New Delhi. Twenty eight Technical Committees of ICOLD will be holding open meetings and workshops to share the most current state-of-practice guidance. Following the ICOLD Technical Committees meetings, there will be a technical symposium on "**Sustainable Development of Dams and River Basins**". This symposium will address various sub-themes, the details of which are given in www.icold2020.org. Throughout the week an extensive trade exhibition will also be organised, where one can meet with the consultants, contractors and suppliers to learn about the latest developments in the dam and hydropower industry.

- In addition, the week will be coupled with a series of workshops on different topics where national and international experts will share their experiences dealing with the advances in dam engineering.

- India being the third largest dam owning country in the world, there is a lot to offer in terms of experiences and technology. INCOLD is preparing an excellent program which will certainly contribute significantly to the long term mission of dam Industry.

- We are looking forward to welcoming the friends and professionals from ICOLD family. ●



88th Annual Meeting
INTERNATIONAL COMMISSION ON LARGE DAMS
&
Symposium on
SUSTAINABLE DEVELOPMENT OF DAMS AND RIVER BASINS
APRIL 4-10, 2020 - NEW DELHI, INDIA



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www.icold2020.org



A third of its kind and a major success AFRICA 2019 focuses on collaboration for water, energy and food security

After the first meeting in Addis Abbaba, Ethiopia, in 2015, a second one in Marrakech, Morocco, in 2019, there great expectations for this third event on the African Continent.

AFRICA 2019 took place between 2 and 4 April 2019 in Windhoek, Namibia, with more than 500 participants from 52 nations, including 22 African delegations, and others from Europe, Asia, North and South America and Australasia.

The three-day event, preceded by three full-day training workshops, was co-hosted by Aqua-Media International Ltd, and the International Commission on Large Dams. The Opening Plenary session, which began with a performance by traditional drummers, brought together keynote speakers who covered world needs for renewable energy and storage systems, project finance, water scarcity, impacts of climate change, and the overall commitment to further development of hydropower and water infrastructure in Africa.

In her welcome address, Alison Bartle, Director of Aqua~Media, drew attention to the large number of major projects currently going ahead in Africa, for which finance had been secured and contracts were being let. Examples were Lesotho Highlands Phase II, Batoka Gorge on the border of Zambia and Zimbabwe, Rufiji in Tanzania, Nachtigal in Cameroon, and a number of others. She previewed some of the sessions, highlighting the importance of talks on project preparation, private sector finance, climate issues, the safety of dams and powerplants, envi-



African traditions were present for entertaining the participants.

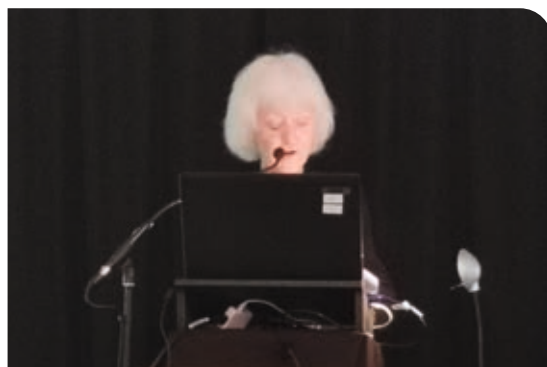
ronmental and social issues, cross-border projects and capacity building.

ICOLD President Michael Rogers spoke of the importance of dam safety, and noting that this was a core value for ICOLD. He mentioned that ICOLD had recently celebrated its 90th anniversary, and noted that there had been many changes in dam engineering and construction during those 90 years, from a few thousand large dams when ICOLD was first founded, to more than 60 000 large dams listed in the World Register of Dams today. He described dams and hydro projects as unique and important infrastructure, which support our countries.

During the conference, an important meeting took place between ICOLD President and Secretary General, on one side, and World Bank representatives, on the other side. The aim was to further collaboration between the two institutions and this was confirmed during a meeting later that year in Ottawa, for the 87th Annual Meeting of ICOLD.

After the plenary, the AFRICA 2019 Technical Exhibition was officially opened, with a ribbon cutting ceremony by Dr Tjipangandjara and the officers of ICOLD, ICID and NamPower. There were 57 companies from around 20 nations exhibiting their supplies and services during the conference and a networking party was held in the exhibition on 3 April.

The next meeting is supposed to take place in 2021, in the Eastern Part of Africa, in Kampala, Uganda. ●



Alison Bartle speaking at the opening plenary session.



ICOLD President and Secretary General (second and third from right) congratulated the Canadian organizers for this great success.

A Resounding Success for ICOLD Annual Meeting in Ottawa (June 9-14 2019)

The 87th Annual Meeting and Symposium of the International Commission on Large Dams (ICOLD) was held in Ottawa, June 9 – 14, 2019. It was a great success by almost any measure. Over seven days, delegates were offered, workshops and meetings of 26 ICOLD Technical Committees and Regional Clubs, two days of technical paper presentations, 12 partner seminars, a trade show and a rich social program, as well as optional technical tours. 1415 delegates participated in this event, coming from 72 different countries. On the weekend of June 8-9, 2019, Canadian Dams Association offered optional short courses based on CDA guidance publications. These courses were Dam Safety Reviews (in both English and French), Public Safety Around Dams, Emergency Management for Dam Safety, and Dam Safety for Mining Dams. Very positive feedback from both Canadian and international delegates indicated the high quality of these workshops, and their relevance in many countries. In addition to the Technical Committees, Monday and Tuesday included important meetings of the ICOLD Regional Clubs and the Francophone Committee. Full agendas were presented at the Asia-Pacific Club, European Club and Africa Nations, as well as INCA (ICOLD National Committees of the Americas). These meetings were very well attended and provided the opportunity for delegates to learn of new projects and specific challenges facing the dam industry in various parts of the globe. The two-day Symposium on Wednesday and Thursday addressed the theme “Sustainable and Safe Dams Around the World.” Nearly 400 submissions were received, over 300 papers were published in the Proceedings, 198 oral presentations and approximately 70 posters were made in Ottawa. The Technical Papers are available for a limited time at www.icold-cigb2019.ca.

Focus on Tailing Dams

Given the recent series of failures on tailing dams, a particular effort was done to engage the mining dams community in ICOLD 2019, and the response was excellent. Mining companies and consultants were active as sponsors, exhibitors and presen-

ters, something which never happened before in ICOLD Meetings. Short course, ICOLD Committee workshop and meeting, and several technical sessions focussing on tailings dams were all very well attended. The Exhibit Hall gave participants an opportunity to connect with owners, National Committees, consultants, and suppliers and provided a forum to exchange information on many facets of the dam industry. In all, 74 companies and organizations hosted 79 booths. The range of technical topics included in the symposium was illustrated by the three keynote addresses. Suzanne Lacasse of the Norwegian Geotechnical Institute made a brilliant presentation on reliability and risk-based approaches for the design and safety evaluation of dams; the full paper, authored by Lacasse and Honorary President Karl Höeg can be read at www.icold-cigb2019.ca. Members of the International Independent Expert Panel (Anton Schleiss, Ahmed Chraïbi and Jean-Pierre Tournier) presented their findings on the cause of the 2018 failure of Saddle Dam D of the Xe Pian Xe Namnoy Project in Laos. Harvey McLeod spoke about the challenges of upstream tailings dams, with reference to the 2019 Brumadinho failure in Brazil.

The ICOLD General Assembly was held on Friday June 14, 2019, when the representatives from 72 countries gathered for the Annual Meeting.

A full day of seminars was offered to delegates who did not attend the General Assembly. These seminars presented topics of interest to the dam community, organized by partner organizations including Waterpower Canada, Mining Association of Canada, Ontario Waterpower Association, Hydro Quebec, International Waterpower Association, SNC Lavalin, Hatch, Ouranos, Canadian Geotechnical Society, Lasalle/NHC, Utah State University, University of Liège, KNCOLD, World Bank and Électricité de France.

Young Generations

A special commitment toward the young generation was done and the result was successful: 10% of the delegates were 35 years old or younger. This was the highest number ever reported at an ICOLD



The ICOLD family after the end of the General Assembly.

Annual Meeting. The full week of activities began on Monday afternoon with a keynote speech at the Young Engineers Forum, by Boris Martin, CEO of Engineers Without Borders, Canadian Chapter. A special social event for young professionals networking was attended at capacity, and a mentorship program was organized to bring younger delegates together to talk to more "seasoned" professionals. At the closing banquet, Marie H el ene Briand (Global Director, Water Power from Hatch) presented awards to Rikard Hellgren from KTH, Sweden, and Brian Andruchow of Golder, Canada, for the best symposium papers by Young Professionals. The best poster award was given to Rashid Radzi from TNB, Malaysia.

Social Events

Evening social activities provided the opportunity to strengthen national and international networks after a full day of learning on technical topics. At each of the three social events, one of the "Diamond" sponsors welcomed the participants and spoke of the value of ICOLD and CDA to their companies - BC Hydro, Hydro Quebec, and Ontario Power Generation. At the opening reception on June 10, R eal Laporte, from Hydro-Qu ebec, reminded that the last ICOLD event held in Canada took place in Montreal in 2003, and he encouraged all delegates to take advantage of this incredible opportunity to share their knowledge. Judging by the comments made over the week, this advice seems to have been heard.

The cultural evening at the Canadian Museum of History was a notable success thanks to the majestic location and access to galleries displaying Canadian history. Bob Schubak, Director of Dam Safety for BC Hydro, invited the crowd to enjoy the evening's musical entertainment and culinary journey. Marking the end of a week of activities, on Friday the farewell banquet was the perfect time to allow Tony Bennett, Director of Dam and Public Safety for Ontario Power Generation, another of the three main sponsors, to address the delegates and acknowledge the contributions of so many people and companies to the success of the week. In closing, he encouraged delegates to share their learnings with colleagues back in their home countries and continue participating in the opportunities that ICOLD offers, and invite them to come to New Delhi.

Main decisions taken during the General Assembly

2 New Vice-Presidents were elected:

- Mr **Devandra Sharma** (India) in replacement of Mr J. Zhou (China) and **Dr. Enrique Cifres** (Spain) in replacement of Mr M. Lino (France)

- **Gothenburg** (Sweden) was elected to host the **91th Annual Meeting in 2023**

The **Questions** for the **27th Congress in Marseille** (France) in 2021 were chosen:

- **Q104:** "Concrete Dam Design Innovation and Performance"

- **Q105:** "Incidents and Accidents concerning Dams"

- **Q106:** "Surveillance, Instrumentation, Monitoring and Data acquisition"

- **Q107:** "Dams and Climate Change"

5 new Bulletins were approved:

- "Tailing Dams Design – Technology Update"

- "Sediment Management in Reservoirs: National Regulations and Case Studies"

- "Selection of Dam Type"

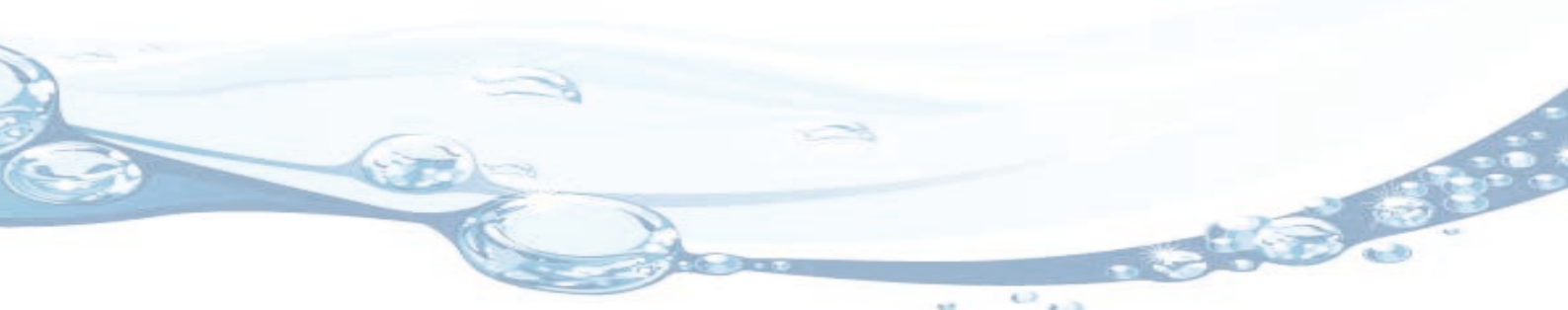
- "Management of Expansive Chemical Reaction in Concrete Dams & Hydroelectric Projects"

- "Challenges and Needs for Dams in the 21st Century"

2 personalities received the **Honorary Awards:**

- **Dr. Ma Hongqi** (China)

- **Dr. Malcolm Dunstan** (United Kingdom)



15th ICOLD Benchmark Workshop on Numerical Analysis of Dams

By Guido Mazza

The 15th Benchmark Workshop of the ICOLD Technical Committee A "Computational Aspects of Analysis and Design of Dams" was successfully held in Milan from 9th to 12th September 2019.

The considerable interest in the event is clearly demonstrated by the high number of participants, about 180 technicians, from 22 countries: Austria, Brazil, Canada, China, France, Germany, Japan, Iran, Italy, UK, Macedonia, Norway, The Netherlands, Pakistan, Russia, Slovakia, Slovenia, Spain, South Africa, Sweden, Switzerland, USA.

Of the 180 registered at the event, 140 took part in the Benchmark Workshop "Numerical Analysis of Dams" (9-10 September), 75 in the technical visits (11 September), and 90 in the "Short course Modern Methods for Nonlinear Earthquake Response History Analysis of Concrete Dam" (12 September).

The event received the patronage of the Lombardy Region and the Municipality of Milan.

The Italian Committee is happy to share this flattering result with the institutions and company

that contributed to the organization (Politecnico di Milano, National Council of Engineers, Research on the Energy System - RSE), with the companies that supported the event as Sponsors (ENEL Green Power, MAPEI, Romagna Acque, CVA - Valle d'Aosta Water Company, AIPO - Interregional Agency for the PO River, Edison, A2A, GELMI), with the companies that hosted the technical visits to Molato Dam (Consorzio Bonifica Piacenza) and Isola Serafini Weir (Enel Green Power), as well as with all the people who took care of the technical and organizational secretariat of the event.

The Chair of the ICOLD Technical Committee "Computational aspects of analysis and design of dams", Guido Mazza, expressed his satisfaction with the result obtained and thanked the previous Chairs of the Committee for having promoted since 1991 the organization of the Benchmark Workshops starting from 1991 and for having given a great impulse to continue their organization so far.

Below, some pictures of the event.



1



2

1- Opening of the works by Giovanni Ruggeri (ICOLD President) and Guido Mazza (Chairman of the ICOLD Technical Committee "Computational Aspects of Analysis and Design of Dams").

2- Technical visits to the Molato dam of the Reclamation Consortium of Piacenza.



Board meetings in Porto and Denver.

ICOLD Board held two important meetings in Porto, Portugal, during Hydro2019, and in Denver, USA, at the beginning of 2020. During

the Porto meeting, the last corrections were made on the World Declaration that we publish in this issue.



Board meeting in Porto.



ICOLD Board visiting Gross Dam.

During the Denver meeting (January 9-10, 2020) in the home city of the President, the Board Members had the occasion to visit the Laboratory of the Colorado State University and the Gross Dam. They passed in review the preparations of the next meetings in New Delhi and Marseille. They discussed the work of the Technical Committees.

On Friday evening, the whole Board was received at the President Michael Roger's home for a dinner with accompanying persons.



Board members visit the lab of Colorado State University.

Save the Date!

5-12 June 2021

2021 CIGB ICOLD MARSEILLE

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**ICOLD
27TH CONGRESS
89TH ANNUAL
MEETING**

**CIGB
27^{ÈME} CONGRÈS
89^{ÈME} RÉUNION
ANNUELLE**

ICOLD President goes throughout the world to preach for dam safety.

Laos to join ICOLD soon

When elected, President Michael Rogers committed himself to make dam safety the number one priority of his mandate. This resulted in the World Declaration included in this issue, but also in a number of advances in dam-building countries. The President made a number of trips to promote this subject, including to India, Canada, Portugal, Brazil, New Zealand, China and Malaysia. Laos is a good example of the results brought by this work.

After having been affected in 2018 by a terrible accident on the billion-dollar Xe-Pian Xe-Namnoy hydroelectric project (40 deaths and 98 missing, 6500 people displaced), the country decided to make inspection of dams a priority.

The Minister of Energy and Mines, Dr Khammany Inthirath, met with ICOLD President with a Laos Delegation during a CHINCOLD meeting on November 11. On December 20, he announced that The inspection of dams will continue to be a priority and that the government will work on a strategic management plan for the sustainable development of the energy sector.

Laos government has decided it was strategically important to join ICOLD, in order to exchange with hydropower specialists from all over the world and to develop domestic skills. Laos should join ICOLD during the next General Assembly in New Delhi.



During the 8th International Symposium on Roller Compacted Concrete (RCC) Dams, which was held on Nov. 11th-12th, 2019 in Kunming City, China, together with the CHINCOLD 2019 Annual Meeting, many satellites meetings took place, including a roundtable on Dam Safety (left) and a private meeting between ICOLD President Michael Rogers and Laos Minister of Energy and Mines (right).

Laos has 63 hydropower plants, with an installed capacity of 7,213MW, generating over 50 billion kWh a year.

In 2019, 12 hydropower plants were completed. This includes the Xayaboury dam, Nam Ngiep 1, Xepien-Xe Namnoy, Don Sahong and other power plants.

Some 27 hydropower projects are under construction and expected to be complete in 2020 and 2021.

Another 112 projects are under construction with an installed capacity of 7,598MW and 340 more projects with an installed capacity of 19,494MW are under consideration.

Laos has abundant river resources and its policy is to encourage investment in the development of hydropower. The growth of this sector is expected to make a significant contribution to poverty reduction, with the resources generated by the selling of power to neighboring countries.

TheDamsNewsletter

- 18 January 2020

Published by ICOLD-CIGB - ISSN: 0534-8293
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