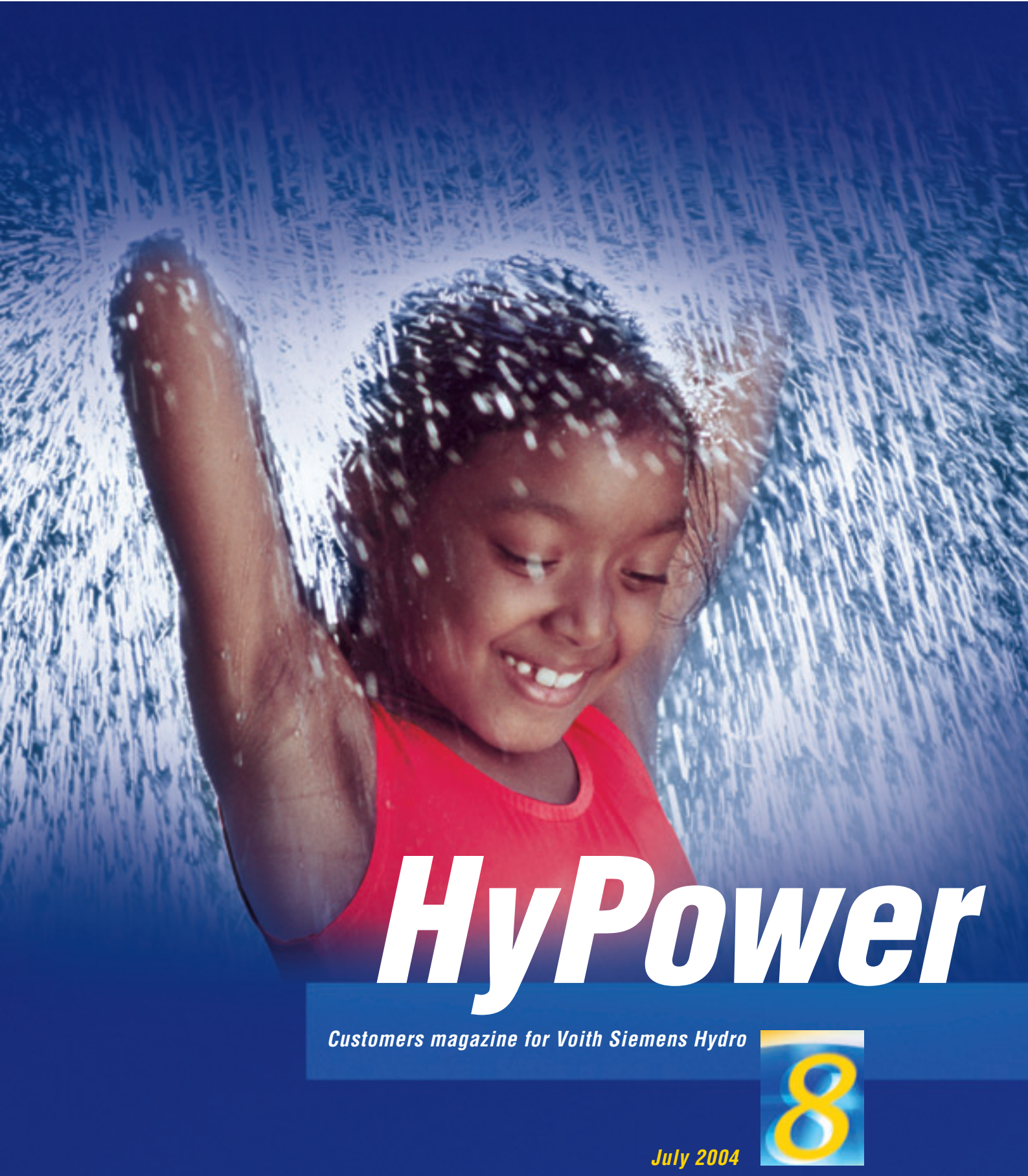

# HyPower

*Customers magazine for Voith Siemens Hydro*

8

*July 2004*

# Summary



# Editorial

# Voith Siemens Hydro Power Generation

***Changing the business and changing with the business***

*Dr. Hubert Lienhard*
*Chairman of the Board of Voith Siemens Hydro Power Generation*

Dear Readers,

There was quite a flurry of information disseminated during the Renewables Conference in Bonn, Germany beginning of June. The outcome of the conference yielded the fact that hydro power is renewable and sustainable. Large hydro is not excluded; all hydro power is considered renewable.

Reflecting on these results, much credit needs to be given to all of those who participated in this debate. An unprecedented effort of combined forces got the job done. My special thanks go to the International Hydro Association (IHA). Through their efforts, hydro is now included in several action plans and declarations. In addition to this most recent achievement, hydro was included as a renewable energy source at the 3rd World Water Forum in Kyoto and the World Summit on Sustainable Development in Johannesburg, again due to the work of the IHA.

Therefore, our focus in this issue is to showcase some of the many activities and organizations who work to improve the public image and awareness of hydro power in both developing and industrialized countries of the world. Therefore, we are pleased to welcome Linda Church Ciocci's comments from the National Hydropower Association of the United States, Richard Taylor's for IHA, Alessandro Palmieri's for the World Bank and Cassio B. Viotti's for ICOLD.

As we prepare for HydroVision 2004, we reflect on a market that has experienced a decrease of new hydro development. Taking up the challenge and focused on modernization, rehab and upgrade expertise in North America, our York, PA operating unit has succeeded in this changing market, by developing new technology and partnering concepts for our customers.

The time for the industry to gather and focus their resources in terms of company and public politics is long overdue.

I am convinced that after years of an uncertain future, we are back on more positive ground, with respect to public and political acceptance. We want to continue to be a partner in the dialogue: changing the business and changing with the business.

We are interested in your opinions and comments, please feel free to direct them to me personally.

Yours sincerely

*Dr. Hubert Lienhard*

My e-mail address is Hubert.Lienhard@vs-hydro.com

# What is hydro's future?

**After the first International Conference on Renewable Energies 2004, June 1-4, in Bonn, Germany, the perspectives for hydro in all sizes is back to where the industry has long thought it should be.**

In its concluding Political Declaration, one of three documents that will form the basis for future international policy, and signed by all 154 participating countries, hydro power was identified as one of the renewable technologies "to be substantially increased with a sense of urgency". This confirms our long-held view that this "fuel" has the capacity to contribute essentially in the world energy mix, and it will take its share as the largest of all renewables, exceeding 90% and around 20% of the worldwide generation mix in all fuels.

The declaration explicitly recognizes that hydro power, together with solar, wind, biomass/fuel and geothermal energy "can significantly contribute to sustainable development, to providing access to energy, especially to the poor, to mitigating greenhouse gas emissions, reducing harmful air pollutants, thereby creating new economic opportunities, and enhancing energy security through cooperation and collaboration."

Hydro's advantages over other fuels need not be listed endlessly and repeatedly, at least that is what we had thought over the years. A big mistake, from which we have started to learn relatively late.

Years of loud NGO protests versus almost mute industry statements seem to be overcome in the meantime.

**Who gets the credit?**
Undoubtedly the positive outcome of the Bonn conference was achieved through the work of IHA and the national hydropower associations (especially CHA, NHA-USA, NHA-Nepal, NHA-India and IHA-New Zealand). According to observers, hydro power also owes a great deal to the determiniation of two courageous energy Ministers from Uganda and Brazil. These two women obviously made strong interventions in favor of large hydro during the plenary sessions in the conference that made a turn-around in the general attitude among delegations from 154 countries. Being a Germany-based international company we had wished for more enthusiasm for hydro during the conference from our own national administrational functionaries and representatives.

**The good in the bad – where it all started: The World Commission on Dams' (WCD) report**
This report, worked out over two years with financing from the World Bank and other institutions, but also the industry itself, did not make the

same industry very happy. However, it finally forced industry's public relations resources to act. Finding the moral basis of the 2000 report was easy for all of us in a world with dramatically increasing needs for power and water. However, to declare the resulting 26 guidelines as the ultimate process manual for everybody could not be a shared vision between NGOs and industry.

**The WCD and DDP processes – our opinion**

We do not state that the WCD report is wrong: it is the result of a two year process among diverse stakeholders who had never come together before. It pointed out negative effects of hydro power that are not debatable, including the influence on existing ecosystems and high social costs through resettlement. On the other hand, WCD also sited positive contributions of dams for electricity and water supply. It is of importance to emphasize that the 26 guidelines for implementation are currently under discussion with regard to their practicability.

**Governance and financing**

Before we recommend guidelines to others, we have to respect the national policy of governments for their countries. Project identification, siting, and development, is usually in their control, rather than in those of private investors. Their rules for stakeholder participation are of paramount importance. What we should do is offer support to them within the framework developed by IEA, IHA and others to help develop the projects in the best possible way.

Secondly, banks and institutions that finance the projects, also influence decision-making policy for projects. Often, standard policies are amended to fit projects in this sector.

Of late, one astounding example with regard to practial approaches, comes from the Asian Development Bank (ADB) that has just invited comments on a proposed change in its water policy that might make it easier to develop large water resources projects. Not with the goal to exclude stakeholders, but "while ADB should continue to pursue its cautious approach to projects involving dams, it is impractical to expect all stakeholders to agree on the justification for such projects". ADB said, "the current requirement is impractical because it requires unanimous agreement of stakeholders".
(Source: Hydroworld Alert, 7th of June, 2004).

**The common future for hydro**

It will be of utmost importance to continue the dialogue among all and to build upon common ground, rather than trying to resolve dissenting views with an all-inclusive process. A very good example for progress on this is that the World Bank is currently working on the sustainable performance of existing hydro assets: the high potential of modernization opportunities in existing facilities creates an efficiency jump that makes new, long drawn out project development often obsolete!

This goal is promoted as a strategic priority by the WCD, and – without doubt – shared by utility owners and industrial companies. Approaches like this clearly show the way forward.

For more information:
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# Making sure that hydro power has a voice

**Through its members in 82 countries, IHA seeks to promote hydro's present and future contribution through better networking, evaluation of good practice, and representation in decision-making arenas.**

*International Hydropower Association (IHA) – Executive Director, Richard Taylor*
*rmt@hydropower.org*

Hydro's future will be influenced by the performance of existing schemes, including those under development, and the willingness to share experience. Barriers for hydro power include:

- disconnects within the sector
- lack of capacity to deliver the positive case for hydro
- hydro's image (academia, government, civil society)
- market-driven policy
- geopolitics
- lastly, hydro might be a victim of its own success

The current world market shares for hydro are 19% for electricity and 91% for generation by renewables. By displacing 4.4 million barrels of oil-equivalent each day, hydro takes from some of the world's most powerful actors. Also, because of its intrinsic advantages, hydro is likely to play a major role in renewables initiatives. This complicates governmental strategies to re-direct funds previously intended for research and development of new energy industries.

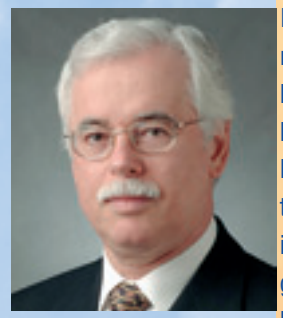
IHA has been building its capacity to align hydro's benefits with the goals of decision makers. It has worked to understand the thinking in political, financial and advocacy arenas. Positive outcomes have been achieved (Johannesburg's World Summit of Sustainable Development, Kyoto's World Water Forum, Bonn's Renewables 2004).

It is now time for the sector to strengthen its resolve to optimize its communications and representation. In particular, it must continue to package hydro in the sustainability box.

For more information:
www.hydropower.org

# Brazil:
# Hydro will keep its share

**We at ICOLD regard dams as an effective development tool, and as a consequence we are fostering the participation of the developing countries as much as possible in our activities. In this manner we think that the experience gained by the countries that already developed their hydro resources could benefit those countries that need it most.**



*Cássio Baumgratz Viotti*
*President,*
*International Commission on Large Dams – ICOLD*
*Past Chairman,*
*Brazilian Committee on Dams – CBDB*

In the case of Brazil, there has been a marked development of the installed hydro power capacity, since the first large dams for that purpose, Três Marias and Furnas, were started in the late 1950's. Since then, the installed capacity of the country has grown 17 fold, while the population has grown 2,5 times. Of the installed capacity more than 80% comes from hydro power and based on Brazilian constraints, only hydro could make that achievement possible.

Currently, Brazil is in the process of changing its regulations, with a significant influence in slowing the pace of new power plant development. Nevertheless, I believe that hydro will keep its large share of new installations, because it is cost effective, the technology and equipment providers are available locally and there is no need to import fuel as in other alternatives.

For more information:
www.cbdb.org.br
www.icold-cigb.org

CIGB
ICOLD

# Water is the issue!

**Developing countries invest about $75 billion annually in water-related investments. About 90 percent of investments come from domestic sources. The World Bank Group has historically invested about $3 billion a year in water-related sectors, accounting for about 5 percent of investment in developing countries. Lending for water accounted for about 16 percent of World Bank lending over the past decade, including irrigation, hydropower, water supply and sanitation, and water resources management (environment, watershed management, etc.)**

*Alessandro Palmieri*
*Lead Dams Specialist –*
*World Bank*

The challenges to improve technical, financial, social, and environmental performance of water management remain formidable worldwide. The World Bank Group is committed to using its knowledge, convening power, ability to link water issues to other sectors through economy-wide engagement, a multi-disciplinary perspective, relations with almost all riparian countries, a combination of knowledge and financial resources, and engagement at all scales (local, watershed, city, irrigation district, river basin and aquifer, country, regional) and ability to integrate across these.

**Investments for growth**

In many countries, investments in water resources infrastructure have high direct and indirect economic growth and development payoffs and can be part of an effective strategy for poverty reduction. Investments in storage dams, hydro power, and other hydraulic infrastructure should be carefully evaluated from an economic, environmental, and social perspective as part of the planning and decision-making process.

**Involve stakeholders**

There is also a special responsibility to include stakeholders in decision making about water and energy, and to ensure that their needs, especially those of the poor, are fully represented.

Decision-making on water infrastructure should be part of a much larger policy framework. Much controversy about dams could be turned into constructive dialogue if the discussion over alternatives is moved upstream in the planning cycle, into policy and strategic planning. This upstream assessment of options should be undertaken with involvement of concerned stakeholders and with due consideration of alternative development plans. When weighing the choice against other options for the development of a sector or river basin, some questions are worth considering: “Would the country pursue expanded electricity or food production? Would it consider invest-

ments in new assets, or would it prioritize rehabilitation of existing infrastructure, or better management of present demands?"

**Needs of countries**

The solutions need to be customized to the needs of the country and need to be country-owned. Water infrastructure does not necessarily mean construction of large dams or hydropower plants. Developing countries need to make large investments in infrastructure of all scales, ranging from local rainwater harvesting structures, to major infrastructures such as dikes, canals, dams, and inter basin transfers. Other countries may need pumping storage systems, tunnels, water transport schemes, underground water storage, etc. Water infrastructure is just a tool, and the benefits of it should be aligned with the needs of the people and equitably distributed among stakeholders. The potential for increasing the performance of existing dams and hydro plants is too often underestimated. Such potential exists in most cases for infrastructures that were designed 30 years ago or more. The resulting direct benefits can include environment, additional storage, peaking capacity, enhanced ancillary services, improvement of reliability, reduced O&M costs, etc.

**Commitment for Hydro**

The World Bank Group will continue to be a partner in bringing about both investment and reform in a sequenced and prioritized manner aimed at achieving sustainable integrated water resources management and water services and therewith responsible growth and poverty reduction. The institution will continue to support hydro power at a range of scales – large, medium, small, and micro – depending on national and local needs and opportunities. The gloomy subject of climate change, the key role of storage in mitigating climate change effects, and the huge energy needs of the planet demand serious responses, based on science, not on ideology or advocacy.

Hydro's future will not appear too bright until the environment-sensible community realizes that serious development of renewable forms of energy cannot take place without further tapping the water cycle, at least for the foreseeable future, especially in the developing countries. The future of renewables is in a synergy between hydro and other forms of renewable energy sources, especially the intermittent ones (wind and solar). Progressive energy utilities are already exploiting this promising avenue. It is hoped that others will follow.

For more information:
www.worldbank.org

# Hydro power in the U.S., a resource with

**Hydro power accounts for approximately 8 percent of the United States' electricity generation and approximately 75 percent of its renewable energy. Over the last decade, however, growth in the U.S. hydropower industry has been rather stagnant. Few, if any, new projects have been built and upgrades at existing hydro facilities or development at non-hydro dams have been scant. While hydro plays an important role in our energy mix, it could play a much stronger role. The potential for growth is far greater than many perceive – and that's a problem.**

*Linda Church Ciocci, Executive Director, National Hydropower Association (NHA)*

Because policymakers and many within the electric industry believe that most of hydro power's potential has already been developed in the United States, hydro power has largely been left out of programs that could spur new growth.

**Potential for growth**

Hydro power has tremendous growth opportunities. According to the U.S. Department of Energy, approximately 21,000 megawatts of unused hydropower potential sit at existing dams in the U.S. If developed, this potential could meet the yearly energy needs for more than 6.9 million homes and result in 42 million metric tons of avoided carbon emissions. This is a tremendous resource that could add significantly to our energy mix and contribute to national efforts to reduce carbon emissions – and we could do this without building a single new dam.

What's more, the growth potential is significantly larger than originally thought. With new hydropower technology – environmentally improved turbines and newly developed low head/low power, free-flow and micro technologies – it appears that hydro power could double its current contribution to our nation's energy mix – going from 255,586,000,000 KwH a year to 500,000,000,000 KwH a year. That's a lot of energy! But to accomplish that goal, we will need to look beyond "traditional" hydro, and so will our policymakers.

NHA
National Hydropower Association

# tremendous potential

**Challenges to growth basically boil down to two problems: Economics and policy.**
With regard to economics, bringing new generation on-line is capital intensive. In addition, there is a regulatory process that accompanies new development – a regulatory process that can be rather expensive and time consuming on its own. Until recently, the low price of competing energy sources, particularly natural gas, and the rising regulatory costs of hydro, have kept new hydro development plans on the drawing board. It has been cheaper and easier to build a gas-fired plant than develop or upgrade a hydropower project. A large gas-fired plant can be permitted and built in 18 months, whereas an existing hydro plant could take as long as 10 years to relicense. Adding capacity or making efficiency improvements to a project can take quite some time under certain scenarios. Uncertainty is a killer in the energy business.

While existing hydro power is a very affordable energy source, new hydro is expensive to build. It, like wind and solar, needs tax incentives to overcome its initial market hurdles.

**NHA is working to overcome these challenges**
The National Hydropower Association NHA, based in Washington. D.C. is the only national trade association exclusively representing the U.S. hydropower industry. The Association's diverse program areas range from policy, advocacy, public relations, legal and marketing to research and development, compliance, dam safety and operations and maintenance.

Over the last decade, NHA has focused its efforts on improving the regulatory environment in which U.S. hydro power operates. We have successfully secured new rules that govern hydro licensing by working to create new hydro licensing processes – the alternative licensing process and the integrated licensing process. We have made significant progress. NHA continues to push for hydro's inclusion in federal incentive programs. But it is anyone's guess at this point if Congress can enact a comprehensive, or even piecemeal, energy policy during this election year. What's more, it will be a huge uphill battle to get hydro power included in a production tax credit (PTC). But NHA continues to fight on Capitol Hill.

**Hydro's future is bright**
Despite the failure to secure a PTC for hydro power to date, I am optimistic about hydro's future. Hydro power offers too many important attributes that are essential for our future energy and environmental needs. It is clean, reliable, domestic and has tremendous growth potential. Policymakers simply can't afford to ignore these facts – and they won't, it just may take some additional time for them to "see the light".

For more information:
www.hydro.org

# *Voith Siemens Hydro in North America*

**The insatiable demand for energy in North America, already greater than anywhere else in the world, continues to grow at a steady pace.**

Hydro owners in the United States focus on increasing energy production by upgrading the thousands of hydroelectric plants that were built from the early 1900s through the mid 1980s, while Canadian hydro owners continue to construct new hydro facilities and modernize existing ones.

With a specialized business strategy known as “Integrated Services”, Voith Siemens Hydro has positioned itself to help customers evaluate, optimize and implement hydro modernization as well as new hydro construction with the focus on value added solutions that provide the lowest total ownership cost.

Examples of this include innovative “fish-friendly” Kaplan and “aerating” Francis runner designs developed, installed and tested to reduce even more the environmental impact of hydro.

The North American operations consist of:

- Headquarters, engineering for turbine, automation and balance of plants, turbine model testing, manufacturing, project management and field operations – York, Pennsylvania, USA
- Generator engineering and manufacturing – Mississauga, Ontario, Canada
- Québec project management and administration – Montréal, Québec, Canada
- Weld Mart – Chattanooga, Tennessee, USA.

Voith Siemens Hydro’s Montréal office has established to a more centrally located, downtown location. Located within walking distance from our main clients and major engineering consultants, Voith Siemens Hydro is now better positioned to service the needs of our Canadian customers. In addition to business development activities in Québec, the Montréal office has been expanded to provide local project managemement and project administration support.


Headed by Sylvain Bouchard, the team which includes Serge Berube and Gilles Latremouille, brings over 50 years of project experience in the electric energy sector. The team is currently managing the Mercier and La Tuque contracts recently awarded to Voith Siemens Hydro by Hydro Québec.

For more information:
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Sylvain.Bouchard@vs-hydro.com

# Voith Siemens York helps US Army Corps of Engineers celebrate 50th anniversary of J. Strom Thurmond

**On April 14th, members of the York project team attended the 50th anniversary celebration of the J. Strom Thurmond powerplant. Attending the ceremony for York were E. Mark Garner (President), Frank Daley (Vice President of Project Management), Greg Snyder (Project Manager), Jim Bartkowiak (Project Engineer), and Yash Amin (Project Administrator). Marshall Hall, Voith Siemens York's Site Project Manager, and his team represented York at the powerhouse tours conducted as part of this commemoration.**

*Aerating Francis runner*

E. Mark Garner was invited to address the attendees along with other dignitaries representing the federal, state and local government, and the Thurmond family.

E. Mark Garner's comments centered on acknowledging the effective partnership which has been built between USACE, Voith Siemens York, and other stakeholders on this project. Celebrating the award given jointly to USACE and Voith Siemens York for aerating runners installed at this jobsite, we look to the future of the project and our relationship.

In addition, E. Mark Garner presented a plaque to Colonel Roger Gerber, District Commander, congratulating the USACE on 50 years of outstanding stewardship to the region served by this project.

*E. Mark Garner and Colonel Roger Gerber*

The J. Strom Thurmond powerhouse is located on the Savannah River in South Carolina, and houses seven hydro units installed back in 1953. Rehabilitation work continues with completion scheduled for 2006. The installation of the first aerated runner has significantly increased oxygen levels and has already exceeded expectations.

This summer, Colonel Gerber took on an assignment in Iraq. We want to wish Colonel Gerber well, and to welcome the new Commander of the District.

For more information:
Mark.Garner@vs-hydro.com

# First outage completed at Bath County

**Voith Siemens Hydro York has completed overhauling the first of six generating units at the Bath County pumped storage station in Virginia, USA. The first outage started in 2003 and was completed with the unit returning to service on schedule in 2004. When fully upgraded, the new unit capacity of 414 MW will result in a plant capacity increase of 8%. The rehabilitation project began in 2003 and will continue for the next six years, with one generating unit to be completed per year.**

*New runner during transportation to site*

*New runner during unit assembly*

Voith Siemens Hydro supplied and installed new components for the pump-turbine and new windings for the motor-generator. Also, during the overhaul of each unit, many of the existing components were rehabilitated in the Voith Siemens Hydro York manufacturing facility. In addition to the installation of the new pump-turbine and motor-generator equipment, Dominion Allegheny Energy has installed new unit controls and excitation systems. During the overhaul, five over-weight and over-sized shipments were made to and from the Voith Siemens Hydro factory.

For more information:
Robert.Steele@vs-hydro.com

# Duke Power to uprate the Jocassee pumped storage project

**Voith Siemens Hydro was recently awarded a contract for the uprate of two large pump-turbines as part of a long-term Integrated Services Alliance Agreement with Duke Power and Devine Tarbell & Associates, Inc. (DTA). The new runners will be the largest ever shipped in one piece from the Voith Siemens Hydro, York, PA factory, with a diameter of nearly 7.5 m and a weight in excess of 130 tons. Although the original runners were supplied by Voith Siemens York/Allis-Chalmers in two pieces over 30 years ago, an extensive evaluation and risk assessment performed by the team resulted in the single piece supply decision.**

*The new Jocassee runner*

The model test was actually conducted a few years ago to establish critical performance results needed to develop a sound business case for the uprate and the new runners will provide very competitively priced, high-value peaking capacity to Duke Power.

*Original two piece runner in the Voith Siemens York/ Allis-Chalmers shop*

By working together from the initial stages of the project, Duke Power, DTA and Voith Siemens Hydro have been able to extract the maximum benefits from the project while minimizing risk through model testing and open dialogue through the entire process. The work will be performed with a two unit outage with the units expected to be returned to service in May, 2007.

For more information:
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# Lower Colorado River Authority partnership extension

*Wirtz Dam, Texas*

*Uprated runner for Starcke*

**Voith Siemens Hydro in York, PA has recently finalized and signed with the Lower Colorado River Authority (LCRA) of Texas a new Alliance Agreement extending the long-term relationship.**

This new agreement updates the Master Services Agreement (MSA) which has since 1994 formed the basis for the modernization partnership with LCRA.

The LCRA program represents one of Voith Siemens Hydro's longest-running partnerships, which will now focus on the modernization of the Starcke plant.

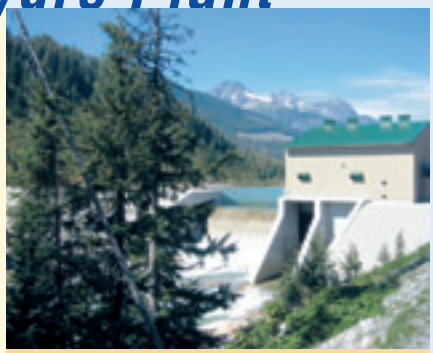
*Starcke inside view*

Mr. Kyle Jensen, LCRA's Manager for River Operations, offered his perspective on this milestone – "In October, the LCRA Board approved the extension of the partnership agreement. The agreement was extended because of the effective and mutually beneficial relationship we have enjoyed with Voith Siemens Hydro in the past. We look forward to continuing this relationship in the future." LCRA and Voith Siemens Hydro are making plans to celebrate this long-term relationship during the 2005 Water Power conference which is being held in LCRA's corporate home of Austin TX.

For more information:
Gregory.Snyder@vs-hydro.com

# Canadian Hydro completes Pingston Expansion Hydro Plant

**On April 26, 2004 the 15 MW Pingston Expansion Hydroelectric Plant began generating electricity and was fully commissioned by April 29, 2004. This plant is an expansion of the 30 MW Pingston Hydroelectric Plant located near Revelstoke, B.C. that achieved commercial operation last spring. The entire plant is 45 MW and is 50% owned and operated by Canadian Hydro. The power and environmental attributes from this plant have been sold to BC Hydro for 20 years. The company's total installed capacity is now 111.4 MW.**



"We are extremely pleased with the completion of our first of four 2004/05 construction projects," said John Keating, Chief Executive Officer. "This project was completed on-time and under budget and will generate predictable, long-term stable cash flow."

Canadian Hydro is a developer, owner and operator of low-impact renewable power plants, which are all certified under the EcoLogoM program. Canadian Hydro Developers, Inc. is passionate about meeting the goals of investors and the needs of the environment.

As an industry leader, Canadian Hydro is focused on building a sustainable future for Canada and with over 14 years experience, Canadian Hydro is the working model for the unlimited development potential of low-impact renewable energy.

The project was handled by Voith Siemens Hydro's small hydro unit, Voith ESAC Hydro, in France.

For further information, please contact:
Jean-Pierre.Fouilloux@vs-hydro.com

# Hydro Québec awards Mercier

**Hydro Québec, one of the largest hydroelectric power producers in the world with a generation portfolio exceeding 35,000 megawatts, has selected Voith Siemens Energie Hydraulique, the Montréal office of North American-based entity of Voith Siemens Hydro, to supply the complete electro-mechanical equipment for Hydro Québec's Centrale Mercier Hydroelectric Station and Centrale La Tuque Modernization Projects in the province of Québec, Canada.**

The contract for Mercier is to design, supply, install, and commission five complete new generating units, each with a capacity of 10 MW. Voith Siemens Hydro Power Generation will supply and install the complete electro-mechanical equipment package consisting of Kaplan type turbines and generators as well as governors, excitation system and controls. The installation and commissioning is expected in the spring of 2006.

For more information:
Alan.Mead@vs-hydro.com

*Québec, Canada*

# Contract for La Tuque

**The contract awarded to Voith Siemens Hydro, York, for La Tuque includes the design, supply, installation and commissioning of three complete new generating units, digital governors and other related components for its existing station at La Tuque, in the Province of Québec, Canada.**

The work to supply the larger Francis type turbines and the 65 MVA synchronous generators begins immediately, commencing with turbine model testing to be conducted at Voith Siemens Hydro in York, PA, USA. The project is expected to be completed in 2009.

The La Tuque powerstation contains six generating units rated at 36 MW each. Three units were previously rehabilitated leaving units 2, 4 and 6 to be replaced with new 58 MW machines in order to meet requirements for additional flow passage through the station.

The turbines are significantly larger than the existing units due to the large increase in flow and capacity. The project involves the replacement of almost all of the existing generating equipment as well as modifications to the existing civil works.

For more information:
Alan.Mead@vs-hydro.com

# *Improving hydro's share: India's 50,000 MW initiative*

**When India started generating electricity in 1897, the source of choice was hydro power. With an estimated potential of 150,000 MW coming from hydro, this choice came as no surprise. The country's first hydro project, Sidrapong near Darjeeling, was thus followed by numerous others.**
**At the time of the country's independence, hydro accounted for around 37% of the total installed capacity and even rose to over 50% in 1963. Since then, hydro's share has declined steadily to the present share of only about one fourth. Now, the Indian government is taking significant steps to boost hydro power capacities to the desired share of 40%.**

*Omkareshwar – successful acceptance of model test witnessed by NHPC (from left to right: W. Kellner, J. Choudhary, J. Sehnbruch, S. Sharma, M. Maiwald, H. Vergé, HW. Kellermann and Dr. S. Riedelbauch)*

Although India has one of the lowest per capita energy consumption rates in relation to comparable countries, it suffers under a shortfall in energy generation and in peaking power.

Furthermore, projections foresee a dramatic increase in energy demand. To address this problem, the Ministry of Power in India has launched an ambitious program called "Power for All". Under this scheme, all villages in India are to be electrified by 2007 and all individual households by 2012. Since the government clearly sees the advantages of hydro electricity as a non-polluting and secure form of energy that, in contrast to thermal generation, is virtually unsusceptible to price fluctuations, it has given high priority to the development of hydro power projects.

**Pre-feasibility studies under way for 162 projects**

In order to convert this potential to installed capacity, a ranking study of the identified hydro potential was undertaken assessing each project. By 2002, almost 400 projects adding up to a capacity of around 106,910 MW were assessed and ranked under this scheme.

The decision was made to generate a tiered list of viable projects which could be developed in a phased manner as a follow-up to the ranking study. In this way, a total of 162 projects with a combined capacity of a little over 50,000 MW have begun preparing pre-feasibility studies which will be completed by September of this year. Consequently, a number of projects will be identified that could be developed during the 11th and 12th Five Year Plan (2007-2017) and beyond.

**Voith Siemens Hydro committed to support hydro's boost in India**

Since October 2003, Voith Siemens Hydro, in consortium with Jaiprakash Industries Ltd. (JAL), India, has been working on the Omkareshwar hydro power project. The 520 MW hydro plant is located on the Narmada River

*Omkareshwar site – excavation works of power house area on the right bank of Narmada river*

*View of the downstream flow section below the runner during the model test*

*Omkareshwar – NHPC and Voith Siemens Hydro test team at the test rig (from left to right: Dr. S. Riedelbauch, KA. Sundararaman, J. Choudhary, S. Sharma, M. Maiwald)*

in India's federal state, Madhya Pradesh. Voith Siemens Hydro is responsible for most of the electro-mechanical equipment, including eight vertical Francis turbines and synchronous generators, each with a rated capacity of 65 MW, associated auxiliaries, and a 220 kV outdoor switchyard. At present, the civil works are in full swing on site.

**Work at Omkareshwar progressing well**

Currently, excavation of the power-house and preparation of concrete works are progressing at site and all Voith Siemens Hydro supplies are on time. Mechanical erection will be starting in August 2004.

Voith Siemens Hydro has begun manufacturing the turbines and generators in its Brazilian facilities and mechanical turbine parts and other equipment in India.

The project is a pilot for Voith Siemens Hydro in various aspects:

- turnkey powerplant execution in a consortium
- fast-track project with 48 months (or less) execution time
- high content of local manufacture

A very robust and compact engineering process involving all Voith Siemens Hydro companies together with JAL as the partner, has resulted in a highly developed and interlinked project execution schedule.

**Model tests successful**

In May 2004 Corporate Technology of Voith Siemens Hydro had successfully passed an intense eight day model test for this project in the presence of experts from the customer, National Hydroelectric Power Corporation Ltd. (NHPC). Contractually committed guarantees and operation parameters had been reached to the full satisfaction of NHPC. After commissioning in 2007, Omkareshwar will be among India's largest hydropower stations.

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# *Motor-generators for 1,000 MW pumped storage project in China*

*Contract signing*

**Voith Fuji Hydro K.K., the Japanese entity of Voith Siemens Hydro, has been awarded a contract in consortium with Alstom Power Hydro by Hebei Zhanghewan Pumped Storage Company Ltd. to supply equipment for the 1,000 MW Zhanghewan pumped storage project in Hebei Province, China. The 67 million euro project is financed by the Asian Development Bank and aims to improve the efficiency of generating energy in the Hebei southern power grid.**

**Excellent teamwork...**

Voith Siemens Hydro's 34 million euro contract includes the supply of four motor-generators, each with an output of 278 MVA, excitation systems, generator main circuit breakers, protection relays and other electrical auxiliaries, as well as installation of all electrical equipment. Alstom Power Hydro, as the leader of the consortium, is responsible for the mechanical equipment including four pump-turbines. The commissioning of the first unit is scheduled in early 2008, the completion of the entire station in 2009.

**...with benefits beyond energy**

The efficiency of energy and the reduction of emissions in meeting peak power requirements are the main objectives of the Zhanghewan pumped storage project, located in China's north-east Hebei Province. This is because the majority of old, small, coal-fired power stations can no longer satisfy these power demands. The reliability and efficiency of existing power plants and – particularly at peak times when working at full capacity – are no longer sufficient enough to guarantee demanding energy supplies.

But the objective of the project reaches beyond improving these aspects: Zhanghewan will also complete the upgrading and expansion of electrification in the modest agrarian areas of the province. In addition, the heightened dam will improve flood prevention and control, and increase the downstream irrigation area. It will also provide drinking water to areas along both banks of the lower Gantao River.

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# Cameron Highlands, Malaysia: Contract for modernization

**Voith Siemens Hydro recently signed a 32 million Euro modernization contract with Tenaga Nasional Berhad, Malaysia's national electricity utility company. During the next three years, Voith Siemens Hydro engineers will be modernizing the three major and two smaller plants of Cameron Highlands hydropower station. The updated power plants will also be equipped with the newly developed VSHyCon Excellent CS7 control system, which allows both local and remote operation.**

**From the late 50s...**
**...heading for tomorrow with an up-to-date control system**

Cameron Highlands is located in the central mountain area in north western Malaysia. Amidst a landscape of brooks and rivers, a cascade consisting of the seven plants Kuala Terla, Kampong Raja, Habu, Robinson Falls, Jor, Woh and Odak was built between 1959 and 1968.

Spring-fed by a system of piping, reservoirs and natural river flow, these hydropower stations have been generating an overall annual output of 281 megawatts since their installation.

In order to guarantee continuous electricity supply for the future, Voith Siemens Hydro was selected to modernize these plants. The scope of supply covers the electrical and mechanical upgrade for the three major plants of Jor – equipped with four 27 MW Pelton turbines, Woh – equipped with three 55 MW Francis turbines, and Habu – equipped with two 2.5 MW Francis turbines, as well as minor repairs to two smaller plants.

In addition to the mechanical upgrade, new plant control equipment will be provided. By installing the sophisticated VSHyCon Excellent CS7 control system, which integrates all power plant control functions from sensors to central plant control level, the operator will be able to operate all seven plants from a central control room at Jor hydropower station.

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# Gilgel Gibe: Opening ceremony for largest Ethiopian hydropower station

**On February 22, Gilgel Gibe, Ethiopia's largest hydropower station was ceremonially commissioned. Together with the government-owned Ethiopian Electric Power Corporation (EEPCO), Prime Minister Meles Zenawi and Minister of Infrastructure Dr. Kassu Illala welcomed government officials and industry leaders to the ceremony. After five years of construction and installation, Voith Siemens Hydro turned over the 184 MW plant to its operators. Gilgel Gibe will guarantee future energy supplies to the Ethiopian capital Addis Ababa, and neighboring regions.**

In 1998, Voith Siemens Hydro signed the contract for constructing, installing, and commissioning a new hydropower station in south central Ethiopia, about 270 km from Addis Ababa. The scope of supply covered three Francis turbines rated at 66.7 MW each, with digital governor systems and turbine inlet valves.

The main financial support for Gilgel Gibe, which will make up 40% of the country's present installed capacity, came from the World Bank Group (IDA) along with co-financing from the European Investment Bank (EIB).

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# Tanzania: Replacement runners for Kidatu hydropower station

**Voith Siemens Hydro has been awarded the supply of new runners for two turbines at the Tanzanian Kidatu I hydropower plant. The original Francis turbines – with a maximum output of 55.7 MW at a maximum head of 173 m, were installed in the mid-seventies.**

The new runners are scheduled to be installed and commissioned in 2005. After modernization, the machines will provide a maximum output of 56.2 MW each. The runner diameter for these new turbines is 2,312 mm.

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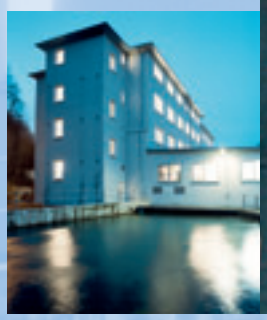
# Successful model test for Austria's Braz station

**This spring, another successful model acceptance test took place at the "Brunnenmuehle", Voith Siemens Hydro's technology testing facilities in Heidenheim, Germany. During a three-day testing phase, the Pelton turbine model for the Austrian Braz hydropower station optimally fulfilled all guarantees and operating parameters as specified in the contract with the Austrian National Railway's power station business division.**

*From left to right: Dr. Wolfgang Rohne (Voith Siemens Hydro, Germany), Friedrich Spitzer (Voith Siemens Hydro, Austria), Helmut Usel (Österreichische Bundesbahnen, Austria), Prof. Dr. techn. Dr. hc. Heinz-Bernd Matthias (Technische Universität Wien, Austria), Dr. Stefan Riedelbauch (Voith Siemens Hydro, Germany).*



*Brunnenmuehle, Germany*

Braz is one of the eight Austrian National Railway hydropower stations which generate so-called traction power – a mode of power especially adapted for train operation.
Voith Siemens Hydro specialists will perform all modernization work on the hydropower plant located in the Vorarlberg region.

Voith Siemens Hydro will replace one of the three existing horizontal Pelton twin turbines. The new unit will be equipped with two runners, each with a diameter of 1,867 mm and an output of 7.5 MW. Power generation will thus be increased from 10 MW to 15 MW. Commissioning is scheduled for 2005.

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Essay

# A lot of water

**Have you ever wondered where on Earth you can find a genuinely large amount of fresh water – pure, fresh drinking water? You need look no further than the Great Lakes. There are five of them, spanning the U.S. Canadian border; they have an overall surface area of about 245,000 square kilometers and contain approximately one fifth of our planet's fresh water reserves – a total of almost 23 quadrillion liters.**

Lake Superior is the largest of the Great Lakes, 563 km long and 257 km wide; the deepest point on the lakebed is 406 m below sea level, and it has a volume of 12,231 cubic km.

But the remaining four lakes are equally impressive. Altogether, they form 16,000 kilometers of shoreline, adjoining eight U.S. states and one Canadian province. The Ice Age glaciers to which they owe their existence also created tens of thousands of smaller lakes, scattered across the entire Northeast and Midwest of the United States, including large parts of Alaska.

The Great Lakes are of considerable interest to the shipping trade. Major ports include Duluth, Minnesota, Superior, Wisconsin, and Buffalo, New York, which is situated at the western end of the waterway that connects Lake Ontario with Lake Erie.

The seaway between the Great Lakes and the Atlantic is deep enough (up to 9 meters deep) for the passage of ocean-going vessels. Ships of all types navigate the 293 kilometers long St. Lawrence Seaway. The Seaway was opened in 1959 and includes a system of canals between Montréal and Port Weller on Lake Ontario.

Including the Great Lakes, this route is over 3,770 kilometers long and is one of the world's most frequently used inland waterways. A curiosity worth mentioning: the Great Lakes are the only freshwater system to have genuine tides, with the ebb and flow often accounting for a difference of 6 meters in height.

The Niagara River waterfalls between Lake Erie and Lake Ontario, on the Canadian-American border, are a natural spectacle of a very special kind. They were created about 4.000 years ago, due to gradually retreating erosion, which to date has dug itself into the dolomite rock 11 kilometers against the direction of flow. A logical development: the Falls are used for generating hydro-electric power. Less than 50% of the water volume of 600 million cubic meters is diverted for this purpose, preserving this incredible monument to nature for all to see.

During the tourist season, the gates that otherwise divert the water into the turbines are opened during the day. Goat Island divides the Niagara Falls into the 350 m wide American Falls and the Horseshoe Falls, which are 800 m wide. About 85-90% of the water flows over the later. A canal between the two lakes makes boat cruises possible, despite the presence of the mighty Niagara Falls.

Because of their impressive scenery the Falls have also become a Hollywood icon. In Henry Hathaway's thriller "Niagara", Marilyn Monroe gave an impressive performance worthy of this inspiring backdrop.

Detroit, the USA's seventh largest city and the world's major motor vehicle manufacturing center, is home to the headquarters of the General Motors Corporation, the Ford Motor Company and the Chrysler Corporation and is situated on the shores of Lake Michigan. These industrial giants have attracted many service corporations in the fields of research, design and advertising to the area.

But along with their industrial significance, the Great Lakes create an eco-system that is unique on Earth, impressing people with its sheer mass, size and beauty. It boasts abundant bio-diversity and vitality, due of course in particular to – the water.

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