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DYNATOM代邦核讯

SHAPING THE NEW KEY TO ENERGY

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Another Hoop?
The hurdles of HAF certification

再接再励？
获取HAF证书的跨栏赛

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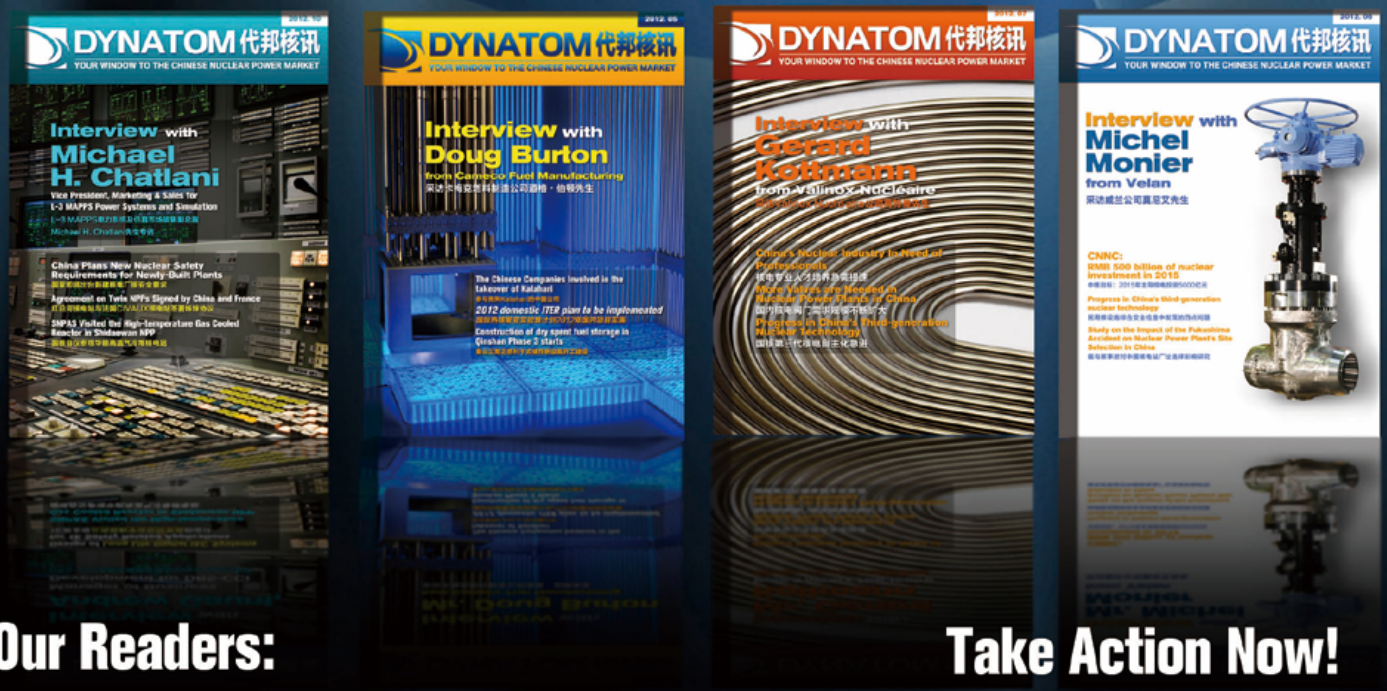
YOUR WINDOW TO THE CHINESE NUCLEAR POWER MARKET



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- Research institutes
- Component manufacturers
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Arnaud Lefevre

Chapter 2:Ignoring the local requirements from the Safety Authority

Since 2004, the safety authority has granted 979 HAF 601 and HAF 604 certifications to local and international manufacturers, installation companies and design institutes.

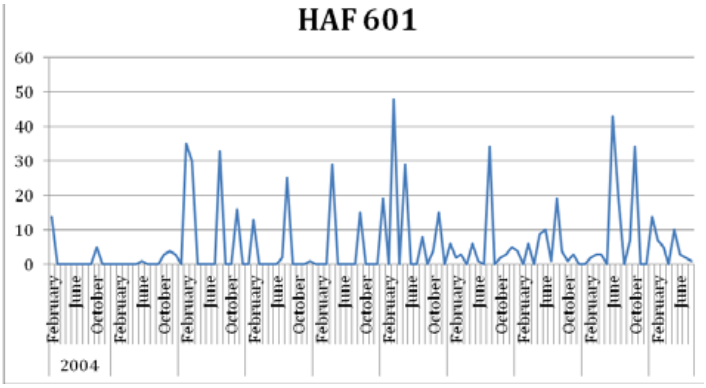
In 2008 this process for foreign companies needed six months.

In 2013, it requires two years at best.

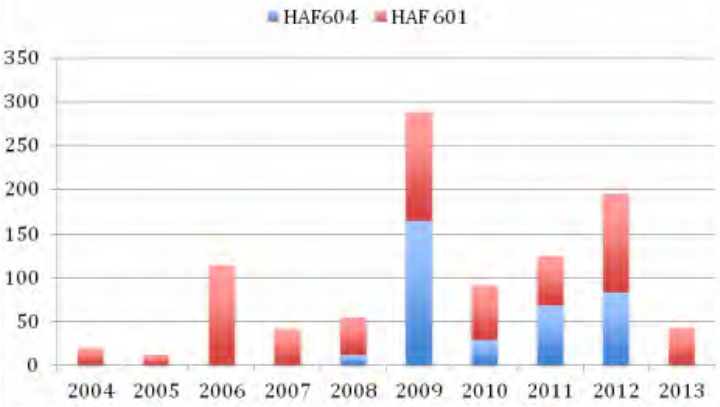
In 2014 many new HAF 604 applications and renewals will be rejected, and there is almost no chance to apply a second time.

The HAF 601 is the center of attention of the National Energy Administration. The more HAF 601 are granted, the higheris the localization rate. However foreign companies based in China will face a new hurdle: local competition means a stalemate for their expansion in the domestic market.

Below: Frequency of HAF 601 awards



Below:Comparison of HAF 604 and HAF 601 awards



There are more than 1,000 applications waiting at the Nuclear Radiation Protection and Safety Center.

You may be in this list.

Last month we introduced the main mistake of poor preparation and planning for the Chinese market. This month we will demonstrate the main reasons for the failure to participate in the market: the absence of local certification.

Chapter 2: Ignoring the local requirements from the Safety Authority

This article will exhibit eight steps, which lead to failure:

- **I**gnoring the duration of the process
- **N**ot complying with the list of documents
- **A**voiding communication with other departments
- **C**hallenging the constraints of the regulation
- **T**ampering the application with external data
- **I**nterfering with business development
- **O**verlooking communication with the NSC
- **N**eglecting to use technical units and consultants

Ignoring the duration of the process

Since 2008, the length of the process has increased from six months to two years.

Most of the companies involved in the market do not want to face this issue and want the certification to be awarded to conclude their business deal.

The foreign manufacturer is not paying attention to the schedule of the NNSA, its technical support units and the internal process of the registration

Let's examine a few examples:

In 2010 a famous German company, reputed for its products in electrical penetration got a deal for a new type of reactor in China, the HTR. This company outsourced the certification and put a lot of pressure on a local agency to get the certification according to its anticipated schedule.

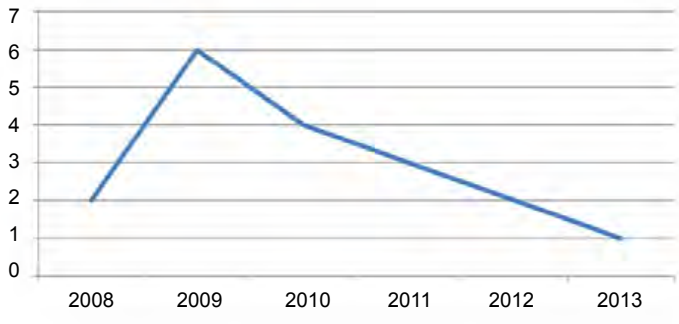
The NNSA did not issue the HAF on time. The agent obtained the certification a few months later, and the deal for the HTR was concluded anyway. However the German company did not pay the overall fee and decided to penalize the agent, a strong sign of foreign arrogance in China.

In 2011, a French company specialized in Casting and Forging signed an agreement to provide a component for the RCP in the Taishan project. The company prepared the HAF application, sent it to China and was waiting for the safety authority to give the certification. After a few months of delay, the company decided to ask a local agency to take over the project, which was concluded six months later (a few days after the Fukushima event). If the company had continued waiting and dealt directly from France, the next certification wouldn't have been awarded until April 2012 - 13 months later!

In most cases the applicant does not foresee the internal process at the NSC and NNSA:

- The inspector may be required for urgent site inspection purposes.
- The inspector may be sent for training.
- The expert committee is cancelled due to a lack of coordination between all experts and a tight schedule. In 2013, one expert committee was held in June.

Frequency of experts meetings per year for the 604



- The backlog of HAF 604 applications is large, so the NSC does not want to accept new ones, except for standalone projects (see below for Tianwan).

- The application from the company was made in 2011 before the transfer of responsibility from the North Regional Office (NRO) to the NSC.

Milestones and Planning for HAF 604 certification			
Milestone	Task	Time estimation for finishing task	Workload per day
Preparation of application file	a. Clarify whether or not the components are included in NNSA's Catalog of Equipment to be registered b. Indicate necessary documents for primary submission of application file Give the applicant detailed explanations on required documents. c. Send samples of application forms to applying company to fill in and give detailed explanations.	3-4 months	1) Paper work (task: a.b.c.d.f.h.i): Four hours 2) Translation (task: e.): Two hours 3) Consulting/meeting with engineers/experts familiar with registered components from related organizations, inspection units, Design institute… (task: a.g.): One hour 4) Others: One hour

	d. Answer questions from the applicant when there is any problem or confusion in preparing the application file On-site instruction if necessary. e. Translate documents provided by the applicant to Chinese Review the translation by engineers f. Draft application file and list the rest of missing documents			
Submission of application files	a. Officially submit application file to NNSA b. According to the result of preliminary examination of National Nuclear Safety Administration, mend and modify the files c. Get more information from the company if necessary.	1 month	1) Submission of application file (a): A half day - one day Note: Only on Tuesday, we can officially submit application file. 2) Paperwork (b.c): Five hours 3) Consulting/meeting with engineers/experts: One hour 4) Others: Two hours	
Further inspection in the nuclear equipment division of NNSA after the application file passes the primary inspection	a. Indicate potential questions which will be raised by the nuclear equipment division in further inspection b. Receive questions from NNSA c. Forward questions to the applicant and give some advice on how to answer the questions	1 month	1) Paperwork (b.c): Five hours 2) Communication/meeting with NNSA: One hour 3) Consulting with engineers/experts: One hour 4) Others: One hour	

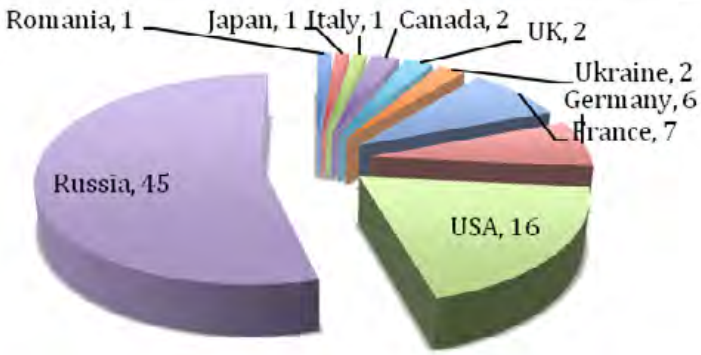
Acceptance fax from NNSA	Translate the fax and send it to the applicant	2 work days(considering time difference)	3 hours
Technical inspection by NSC (NNSA's technology support unit)	a. NSC will raise several batches of questions and send them to Dynabond; b. Dynabond will answer some questions if we can; c. Translate other questions and send them to the applicant as soon as possible; d. Give the applicant instructions on how to answer the questions; e. Sort of the answers from the applicant and officially submit them to NSC. f. Organize a dialog meeting between NSC and the applicant	5 months	1) Paper work (b.c.d.): Five hours 2) Communication/ meeting with NSC/design institute/engineering companies (a.b.c.d.e.f.): One hour 3) Consulting with engineers/experts: One hour 4) Others: One hour
NSC writes a report on the capacity of the applicant	a. Keep close contact with NSC and get updated status of HAF 604 inspection b. Assist the applicant to clarify all questions	1 month	1) Paperwork (b): Five hours 2) Communication/ meeting with NSC/design institute/engineering companies (a.b.): One hour 3) Consulting with engineers/experts: One hour 4) Others: One hour
NNSA/NSC hold	a. Coordination between NNSA/NSC and the applicant b. Assist the applicant to clarify all questions	25-35 work days	1) Paperwork: Four hours 2) Communication/ meeting with NSC/design institute/engineering companies (a.b.): Two hours 3) Others: Two hours

NNSA publishes approval HAF 604 applicant on its official website	Coordination between NNSA/NSC and the applicant to ensure the information on the certificate is complete and correct.	25-30 work days	Communication/meeting with NNSA: One hour; Translation of the information sheet which is published on the website and send to clients for confirmation: Three hours
Receive hard copy of HAF 604 certificate	Dynabond asks for an authorization letter to fetch the certificate on behalf of the client, Dynabond then sends the HAF 604 certificate to its client.	40 work days	Go to NNSA to fetch the certificate with client's authorization letter:Two hours

List of Russian Companies recently certified for Tianwan 3 and 4

- PDTI Atomarmproect
- OAO Baltiyskyzavod
- LLC The Lebedyan Machine-building Plant
- LLC Polesye
- LLC Atomspetsservice
- JSC Okb Gidropress
- JSC Kontur
- JSC Soyuz-01
- JSC Tyazhmash
- JSC Specialized scientific research institute for instrumentation engineering
- JSC Scientific and production firm Central Valve Design Bureau
- JSC Liski Plant of Mounting Workpieces
- JSC Engineering company Ziomar
- JSC Central Design Bureau of Machining Building
- JSC Atommashexport
- JSC Enmash
- JSC Machine-Building Plant Zio-podolsk
- E4-Central Dynamic Installation Joint Stock Company
- Alpha - La Wa Li - PatoKe GV Gold （阿尔法－拉瓦利－帕托克开放式股份公司）

- The schedule mentioned in the regulation is not respected (see HAF 604 art. 9)



HAF 604 awards are made twice a year at most, in a large batch. Assuming your company has a contract in the pipeline, if you are not included in the batch and missed one expert committee, your will be penalized by your client for a ten month delays - the six months before the next expert committee and four months to obtain the hard copy of your certification, required for customs clearance in China when your products are delivered to the port.

The Russian case

For the whole year of 2012, 83 applications were awarded; nevertheless, the majority of them (45 certifications) were dedicated to Russian companies forTianwan3 and 4 projects:

The HAF certification for the Russian companies was a result of a political decision to accelerate the Tianwan project. Their applications will be restricted to the VVER technology.

The NSC had to focus on the certification of Russian companies. The certification for the Tianwan suppliers impacted the certification process for other companies involved in AP1000, CPR1000, EPR and other projects.

Not complying with the list of documents

In principle, the regulation is very simple. In the HAF 604 article 6, the applicant company must:

- abide by laws and regulations of the People's Republic of China
- be a legal company in its own country
- have achievements and at least 5 years of experience in the fieldrelated to the activities planned
- have a workplace, facilities, componentsthat match the planned activities and qualified professional technical staff
- have a quality assurance system matching the planned activities
- have a corresponding certification from the nuclear safety management department of its own country

Any company can provide such information, but the most important point is in the HAF 604 article 7, paragraph 7: "When applying for registration, overseas unit shall supply the following materials"…other materials NNSA asks for".

What does "other materials" mean? It means every document required by the technical support unit, the NSC, such as test results, letter of satisfaction from your former clients, welding certifications, non-destructive testing reports, anti-seismic reports, flooding test reports, and the list continues…

- If your product is an innovation, forget about the registration, it must have references in operating nuclear power plants.
- If your product has not been used for five years, it will not be accepted.
- If your company does not keep the purchase orders or proof that your product has been used, you will not be accepted.

Many companies do not digitalize their documents and store them. Nobody in their quality management department is willing to dig in the cellar.

The applicants do not take into consideration the constraints from the NNSA:

- The NNSA and its technical support units have limited human resources and funding.
- The NNSA has been trained by EDF and the French authorities, andadjusts gradually to the NSC regulations.

Documents Required for certification

- Copy of business license
- Qualification Certificates received from the nuclear industry or any nuclear-safety supervision authorities, such as ASME, ISO 9001, ISO 14001…
- Standards to manufacture or design products, such as IEEE, RCC-E, RCC-M, IEC…
- Quality Manual/Quality Assurance Program
- Description of equipment to be registered
- Form for reference/achievement list for nuclear power plants around the world
- Form for reference/achievement list for non-nuclear projects
- Form for NDT staff + qualification certificates to be attached
- Description of the work place and facilities, including equipment used for manufacturing, testing and experiment.
- Outsourcing items when manufacturing or designing your product, such as seismic analysis or test/EMC test/Environmental test, and main sub-supplier list
- Signed Petition Letter to NNSA officer
- Letter of Entrustment to NNSA
- Staff description including qualifications and qualities.
- Key people in design, manufacture and QM
- Description of staff training
- Design approval documents from purchaser; design diagram with the signature of the designer; designer information form(major, education, work experience, years of working…); description of how to do design verification; description of how to allocate design tasks, such as design approval, design check and design verification; description of design software...
- A whole set of supply contracts/purchase orders + Factory Inspection Report from vendor/supplier + Receiving Report from buyer/purchaser.
- Complete and correct application forms-Chapter 1
- Qualification test report of your registered components. Please give a general description of these tests. For example, what kinds of tests have been done; what are the results of these tests; where did you do these tests…
- Procurement Letter of Intent for your registered equipment

- The certification in China is a new obligation; the HAF 604 was promulgated in 2008, four years after the HAF 601.
- The certifications and needs change constantly.
- The HAF 604 is free, therefore brings more workload to the NSC and experts.
- The Fukushima accident impacted the conditions of anti-seismic and anti-flooding tests and reports.
- References from Taiwan are not considered as from a foreign country.
- More than 1,000 applications are waiting on the desk of the NSC.

These constraints must be anticipated by the project manager from your company and be shared with other departments that are involved in the Chinese market. This is not the case

Avoiding communication with other departments

Generally, three types of companies apply for the HAF and each of them has their weaknesses.

- The SME
- The Company acquired by a foreign group
- The Multinational

The SME designates the quality manager or the project manager to the HAF certification. The internal process is faster due to the limited number of departments.

When the SME sells its product, if the end user is not the operator, the reference required by the NSC will not be fulfilled. A French SME, which provides forged components to valve and pump manufacturers for the EPR faced this issue: the NSC required an end user statement that can not be provided.

Spare parts may not be considered as references:several SMEs in the US and France during the last twenty years focused on after-sales service and spare parts rather than business development.

Some companies acquired by larger groups, become a brand and do not have the power to sign agreements. This type of situation will require the quality manager from the factory to have its application signed by headquarters.

A British company acquired by a US group faced the problem of coordination and timing: the manager in charge of the signature of every page of the application did not see the HAF as a priority, while the British company had a contract to fulfill for a diesel generator in China.

Many mistakes in the applications and new requirements from the safety authority made this project complex; the documents were translated and printed in China, sent back for review and approval in the UK and signed in the USA when the manager had time.

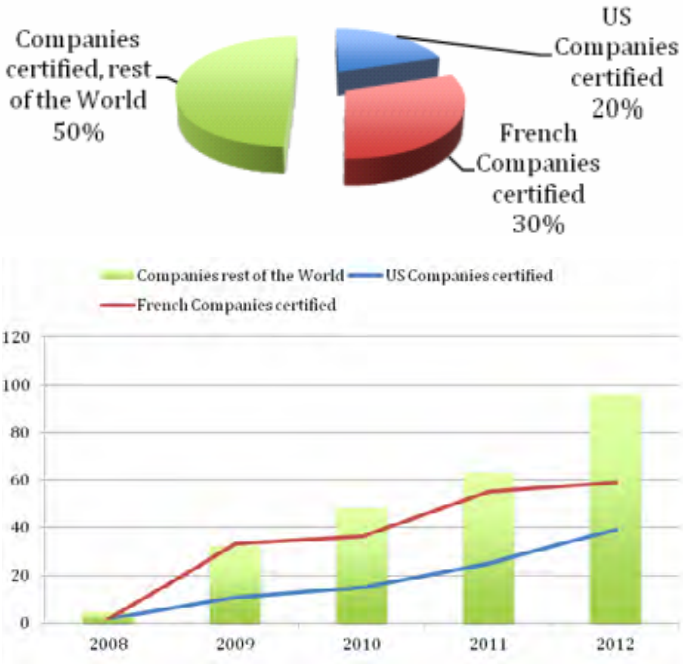
The multinational is even more complex. The group is split between the legal department in charge of all the purchase orders, the quality manager has often no power (in particular in the US), the project manager is just a “coordinator”, the top management focus on the business operation, and other “export controls” or any other bureaucratic entity.

Each department has its own plan, priority, and tolerance to external persons commitment and inquest.

In particular, in the US where email seems to have become the only way to communicate between each other, the success of US companies certified in China is unexceptional, considering that:

- Half of the next nuclear power plants in construction in Chinaare based on AP1000 technology.
- The government strongly supports trade between the US and China.
- The acquisition of the AP1000 technology was official by the end of 2006 and the HAF 604 certification was promulgated in 2008.

Below: Share of US Companies certified by the end of 2012. During the last five years, the multinationals that have applied for the certification have had common weaknesses: the lack of leadership and determination.



Note: Among all the foreign enterprises involved in the Chinese nuclear power market, only one is in the 100 top leaders list of PowerRank: David Farr, the Chairman of Emerson Electric.

Challenging the constraints of the regulations

The regulations and application forms are bilingual.

The application must be completed in Chinese with the support

of documents in English.

In case of misunderstanding, the Chinese language and the internal regulations of the NSC prevail.

Despite the NNSA having listed all the products subject to certification, the expertise in safety related equipment and components is still mushrooming.

One case still being challenged by the foreign side and the Chinese regulator is the Emergency Diesel Generator.

- According to the regulation in 2010, some of the safety related equipment had to be certified.
- Since the Fukushima accident, more components and sub-components need to be certified.
- Last year, most of the components did not need to be certified.

What happened during each step?

Originally, the representatives in Europe could not understand the indecision, the variation, the new conditions from the inspectors, and often refused to provide the documentsin fear of losing their intellectual property.

Upon the advice of the agent, the company met the NSC, dealt with the new requirements, and obeyed the injunctions, statements and even embarrassment (the local agency, that was in responsible for this application, reported later the factual wording from the Chinese authority).

Still, the company succeeded, and reached its outcome.

Although this case was successfully concluded, most of the time, the NSC at the counter rejects the application due to the lack of documentation and explanation.

Both sides are guilty. The regulation is vague, the application even more so. It does not provide an example of the step-by-step process.

This lack of explanation is certainly due to the fact that the service is free, the service is just burgeoning and the service needs to find itself a specified standard.

On the other side, the quality manager, the legal department and the design or engineering departments do not want to provide proprietary patents and other information that could leak to any engineering company or local competitor.

The foreign side obviously presents its information cautiously when it is required, not when it is needed.

Furthermore, the foreign side does not know how to prepare the application. Often the company would just ask around other manufacturers “how they did it” and would get a minimum of feedback, and would just attempt to understand the meaning of this application,

List of companies that face the HAF renewal process

- Alfa Laval Lund AB
- Alstom Power Turbomachines
- Andritz AG
- Areva Np GmbH
- Areva Np SAS
- Auma Riester GmbH&CO.,KG
- Bernard Controls S.A.
- Boccard S.A.
- Bohler Welding Company
- CCI Thermal Technologies Inc.
- Clextral S.A.S.
- Clyde Union Ltd. Incorporating Weir Pumps Glasgow
- Creusot Forge
- Curtiss-Wright Electro-Mechanical Corporation
- Doosan Heavy Industries & Construction CO.,Ltd.
- Emerson Process Management S.A.S.
- Ensa
- Erndtebrücker Eisenwerk GmbH&CO. KG
- Erne Fittings GmbH
- Fisher Controls International LLC
- Fives Nordon
- Flowserve Corporation – Raleigh Valve Facility
- Fuji Electric
- Georgin
- Griss
- H.Butting gmbh & Co.KG
- Hy-Lok Corporation
- Invensys Corp.
- Jsw Corp.
- Kley France
- KSB Aktiengesellschaft (KSB AG)
- KSB S.A.S.
- Lisega AG
- Man Diesel S.A.S.
- Manoir Industries Custines
- Manoir Industries Pitres
- Mirion Technologies (IST France)
- Mirion Technologies (MGPI) S.A.”

- Mitsubishi Electric Corporation
- Mitsubishi Heavy Industries, Ltd.
- MTU Friedrichshafen GmbH
- Nexans
- PALL (Portsmouth), a Division of Pall Europe
- PrysmianCâbles et Systèmes France S.A.S.
- Pyro-Contrôle
- Quiri
- Reel SAS
- Ringo Valvulass.l.l
- Rolls-Royce Civil Nuclear SAS
- Rosemount Nuclear Instruments,Inc.
- Samshin Limited
- Schneider Corporation
- SDF
- Segault S.A
- Siemens AG Efie 49
- Siemens Building Technologies HVAC products GmbH
- Sipos
- Sofinel S.A.
- Swagelok Corporation
- Tectubi Raccordi S.p.A. Italy
- Thermo Gamma-Metrics LLC
- Trentec, a Division of Curtiss-Wright Flow Control Service Corporation
- Tyco Raychem Corp.
- Union Pump S.A.S.
- Valinox Nucleaire
- Vanatome S.A.
- Velan SAS Lyon
- Weed Instrument Company Inc.
- Weir Valves & Controls UK Ltd.
- Westinghouse Electric Corporation
- Wilh. Schulz GmbH
- Wpi-France

post it to the safety authority and wait.

In China, every Tuesday morning, the inspector can answer any question related to the applicationface to facewith the company. But the resources are limited, the application is free of cost (contrary to any service provided by the NSC) and time is precious for the technical safety units.

When you meet the inspector with your application, do not play…

Tampering the application with external data

Nobody would do this, right?

A northern European company acquired a French company a few years ago. The factory closed, the patents and other know-how moved to the brand new factory in the northern European country (let's say between Norway and Russia). When this factory applied for the HAF 604, it used the references of the French factory as references of the group.

The management tried to explain to the safety authority that any reference from any branches should be considered as a reference from the group.

In the regulation, it is clearly stated (Article 7.4: "When applying for registration, an overseas unit shall supply the following materials […] Materials about its related achievements in the field".

For its own defense, this company was using the article 14: "Where a unit registered changes its name,country,location or legal representative, it needs to apply for alteration of registration certification in less than 30 days after the alternation of these items in its own country".

That was not tricky, the application was not done by the French factory. The NSC rejected the application.

Another case is related to a German company manufacturing valves.

The company is a successful supplier of non-safety related valves. The company intended to expandits business in safety valves.

The company provided documents, which indicated the intention of Areva to purchase valves for the EPR projects upon certain technical conditions.

The company explained to the safety authority that it was a supplier of Areva for such type of valves and used this document to support the application.

After an investigation with Areva in China, Germany and France, it was discovered the company participated in the tender but could not meet the requirements.

The company was not a supplier of Areva for the EPR, but continued to pretend to be one in order to get the HAF 604.

Both companies are “black listed” by the safety authority.

Interfering with business development

The safety authority will not accept any new application at the counter.

The number of references or the quality of the application will not change this fact.

Only one motive can help the applicant to go through: the letter of intent.

Many foreign companies adopt an awkward strategy: the business development starts too early, too late, and is not adapted to the HAF process.

In 2008 and 2009, many agreements were signed, in particular by the CGNPC group with foreign enterprises that did not have the HAF 604. The safety authority penalized CGNPC for not respecting the regulation.

In 2011 a major company in Europe imported bent tubes for the manufacturing of heat exchangers in China. The company in charge of manufacturing the tubes was different from the company that bent the tubes. The latter one did not have the HAF 604.

The multinational signed the supply agreement; the cargo arrived in China, but could not be opened until an agreement was made with the safety authority. However, this multinational could have faced a major blow and could have been required to present a new set of bent tubes which would have brought a delay of 18 months.

In this market the sales managers need to find clients and secure a purchase order.

The end user will not sign any purchase order if the HAF 604 is not obtained.

However if a letter of intent related to a specific project is provided to the supplier, it can be used for the application to indicate to the NSC that specific equipment is needed in China.

To clarify this point, you follow this step-by-step methodology:

1. Start the business development and the HAF process at the same time.

2. Get the application ready to be presented to the Safety authority.

3. Get a letter of intent, or any document that indicates that your product is needed from your prospect.

4. Negotiate with your prospect (or new client) the time of manufacturing and delivery according to the process of the HAF 604 and involve the client in the process with the NSC.

5. Apply with the organized documents at the NSC counter (every Tuesday) and follow the process.

6. Inform your client on a regular basis of the status of the process and add six months of delay (the time needed between the expert committee meeting and the delivery of the hard copy) in your contract with your client.

Below: a list of the companies that will face the renewal of their certification within the next six months:

Overlooking communication with the NSC

The NSC became the center of attention of the government only in 2009. Before that, the center was relatively small, and the HAF activity was mostly supervised by the NRO.

Many young engineers were hired, bright guys, but did not compare to their counterparts at the GRS in Germany, or IRSN in France. They needed to get educated by the operators, the manufacturers and foreign TSO.

Despite this burgeoning activity, the inspectors face many hurdles:

1- a booming market

2- a large geographical area

3- a limited budget (compared to western counterparts)

4- thousands of applications - local and international.

The young inspectors of today will become the leaders of nuclear safety in China. There is no doubt about this. Above them some well experienced directors, trained in Europe and the US have a clear understanding of foreign and local technology.

One problem remains: most of the companies do not know them. Nobody hides them, you can find their names on many websites, documentation and technical seminars. The main focus of the manufacturer is the procurement department of the EPC or the operator.

In the nuclear power market, based on the safety culture, it is the duty of each company to remain close to the safety authority and to its technical units and educate them on the new aspects of the design and manufacturing, NDT, installation and so on.

By focusing only on the design and procurement departments

of the EPC, the companies create a gap of communication that slows down the business process.

Any companies, in particular, from the US that deal in China should take into consideration the working method with the NRC and apply it with the same endeavor in China.

By disregarding the relationship with the NSC, the NRO and the NNSA, the companies will not be able to reach the right department or decision maker to negotiate with and will rely on the EPC companies.

The same EPC companies do not want to deal with the safety authority, as each intervention would be regarded as a complaint or favor.

In order to reach the decision maker and understand the internal process of the application (whatever the application is), China has great technical support units that are often forgotten.

Neglecting to use technical units and consultants

In order to implement the safety culture in this market, the safety authority uses several entities.

Most of the foreign companies have never heard of the China Academy of Mechanical Science and Technology (CAMST).

This is a mistake.

The CAMST designed and wrote the HAF 601, 602, 603, 604 regulations and many others.

The CAMST knows the decision makers at the safety authority; they know how the competition applies and know what an inspector wants to read in the application.

The CAMST is not allowed to interfere in the process or even to communicate with the safety authority in favor of any company. However the CAMST can educate the applicant, review and advise on the documents and references needed and the latest regulation requirements.

Another entity, the Suzhou Nuclear Power Institute, is a trustworthy technical unit (it belongs to the CGNPC Group) and consults for local companies mostly.

The main concern of foreign companies is these entities passing confidential documents to local competitors.

If the secrecy of documents in China is hardly a convincing argument, it is the duty of each company to hire the proper managers, and consultants and to assess which page, which agreement, which report can be passed and may be published or reproduced.

There are more than twenty government agencies involved in the supervision, planning, enforcement, technical support, research and other activities related to nuclear safety and the environment in China (see list).

These agencies participate in the formulation and use of the regulation that affects the business of any manufacturer.

There are more than 170 regulations (HAF, HAD, other guidelines and laws) that affect the overall nuclear power activities. These regulations are constantly reviewed internally to be adapted to needs of the market and in respect of international standards and practices.

They impact the following areas:

- Ageing
- Decommissioning
- Environment
- Installation
- Management
- Operation
- Manufacture
- Nuclear Fuel
- Training
- Safety
- Protection
- Standard
- Transport
- Radiation Protection
- Radwaste
- Nuclear Material

Most of the foreign companies know only one: the HAF 604

In this market of 162 billion USD until 2020, and 194 planned nuclear power plants, most of the companies, local and international do not have the right focus.

As Keith Cunningham, the author of “keys to the vault” said: “in sport, if you cannot read the score board, you cannot understand the game”

In the biggest nuclear power market of the century, if your company does not know the regulations that will affect the business and your client's activities, you cannot survive.

Government Agencies involved in the Protection of the Environment

- Environmental Emergency and Accident Investigation Center
- All-China Environment Federation
- Assessment Center of Environmental Engineering
- China Association of Environmental Protection Industry
- China Eastern Environmental Protection Supervision Center
- China Environmental Culture Promotion Association
- China Environmental Protection Foundation
- China Institute of Environmental Sciences
- China National Environmental Monitoring Center
- China Research Academy of Environmental Sciences
- China Southern Environmental Protection Supervision Center
- China-Japan Friendship Center for Environmental Protection
- Chinese Academy for Environmental Planning
- Foreign Economic Cooperation Office
- Nanjing Institute of Environmental Sciences
- Northeastern Nuclear and Radiation Safety Supervision Office
- Northwestern Nuclear and Radiation Safety Supervision Office
- Northwestern Southern Environmental Protection Supervision Center
- Nuclear and Radiation Safety Center
- Sichuan Nuclear Safety Monitoring Office

Next Month Failure: Accelerating the creation of a local office

I would like to thank Elaine Li from my team for all the data research.

DYNABOND
Powertech Services

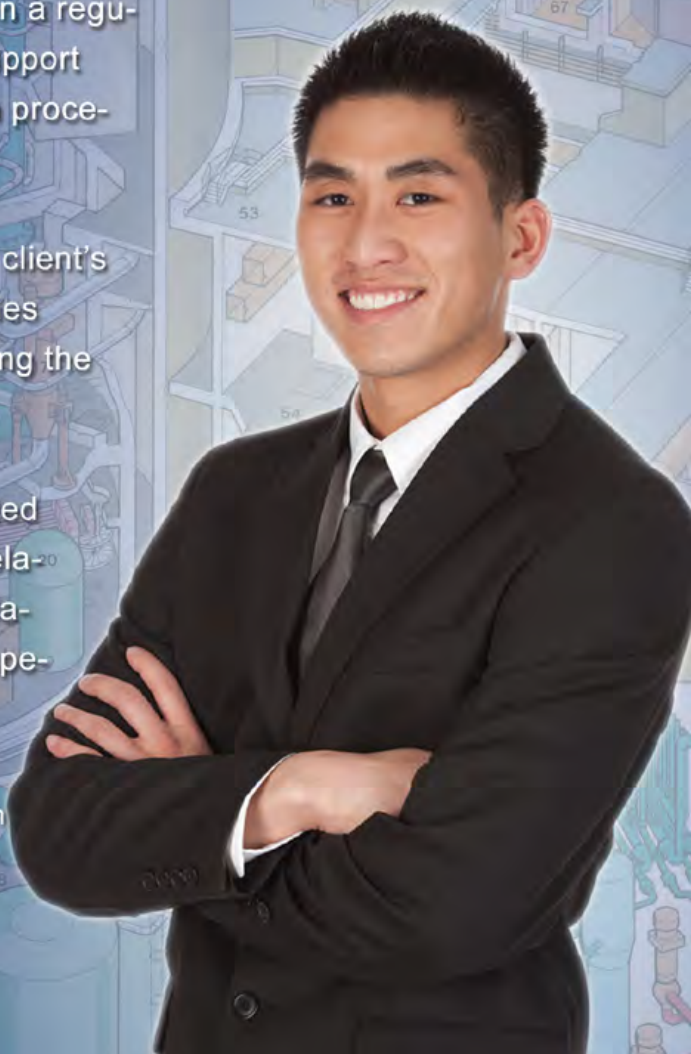
Our Expertise:

Technical Consultancy

With over five years experience in the field, Dynabond Powertech Service has a dedicated team specialized in the certifications HAF 604 (regulation concerning Imported Civilian Nuclear Safety-related Equipment) and HAF 601 (regulation on the Supervision and Management of Design, Manufacture, Installation and Non-destructive Testing of Civil Nuclear Safety Equipment). Compliance with these is necessary in order to meet with all regulation requirements of the Chinese Nuclear Power Industry.

Our Services:

- Planning – We design a complete strategy for registration, translate every document and adjust the application according to the safety authority's requirements.
- Analysis and clarification - Communication on a regular basis with the regulators and technical support units in charge of the application supervision procedures, and application review process.
- Onsite inspection - Our engineers assist our client's quality control managers to answer all inquiries during the factory visit, in particular concerning the HAF 601 procedures.
- Administrative support - Our team is connected with buying and authorizing bodies. These relationships are beneficial when obtaining regulatory compliance – a necessity for gaining a special import permit.



For more Information contact us: info@dynabondpowertech.com
http://www.dynabondpowertech.com/en/service/certificate-for-civil-nuclear-equipment

INTERVIEW

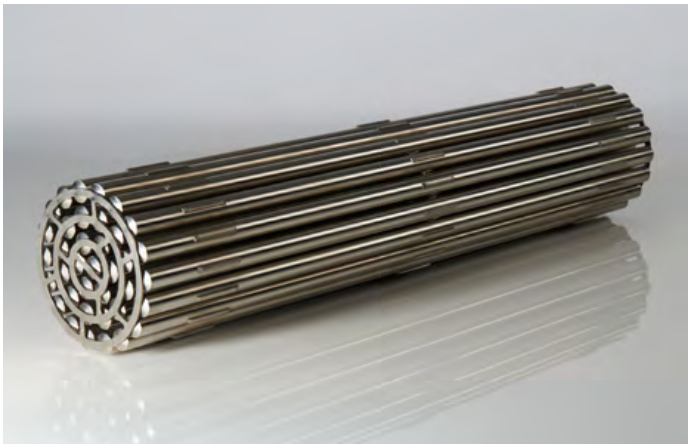
Interview with Ala Alizadeh, Seninor Vice President of Marketing & Business Development at Candu Energy

Interview with Ala Alizadeh, Seninor Vice President of Marketing & Business Development at Candu Energy

Tel: 1-866-962-2638 Email: spmbd@candu.com

DPS: Could you briefly introduce yourself? When did you join Candu Energy and what are your responsibilities?

Ala Alizadeh: I am Ala Alizadeh and I am the Senior Vice President of Marketing & Business Development at Candu Energy. I have worked in the nuclear industry for over 30 years and have been involved in the design and construction of several CANDU® reactors in Canada and around the world. I joined Candu Energy when the company was formed in 2011. Previously, I was at Atomic Energy of Canada Ltd. (AECL) for close to 30 years.



CANDU Fuel Bundle

DPS: Why did you originally join Candu Energy?

Ala Alizadeh: I joined Candu Energy to continue promoting and advancing CANDU reactor technology as an efficient, economic and environmentally beneficial means of electricity generation in Canada and around the world.

DPS: What kind of services does Candu Energy supply?

Ala Alizadeh: Candu Energy is a leading full-service nuclear technology company that provides nuclear power reactors and nuclear products and services to customers worldwide. We have close to 1,400 employees who design and deliver state-of-the-art CANDU reactors, carry out life extension projects, offer operations, maintenance and plant life management services for existing nuclear power stations.

CANDU reactors supply approximately 50 per cent of Ontario's electricity and 16 per cent of Canada's overall electricity requirements. Internationally, they are an important component of clean air energy programs on four continents with over 22,000 megawatts of installed capacity. Candu Energy develops products to deliver safe, reliable, affordable and CO2-free energy with a view to the future, while meeting the global nuclear industry's highest safety and regulatory standards.

DPS: You also supply quality products and services for Pressurized Water Reactors (PWRs), Boiling Water Reactors (BWRs) and other energy sectors. Could you give us some examples of you products and services? And for those NPPs, which countries import your products and services?

Ala Alizadeh: Candu Energy has a growing business providing products and services to CANDU and non-CANDU reactors alike. Our emergency core cooling strainers are installed in reactors in Argentina, Belgium, Canada, France and the United States. Our passive autocatalytic recombiners prevent hydrogen buildup in Canada, Finland, France, Korea and the Ukraine. Candu Energy's specialty pump seals lead the nuclear industry in reliability and duration of service. Longlasting and reliable, they are installed in both CANDU and non-CANDU reactors.

DPS: Candu Energy was set up in 2011 and took over AECL's commercial reactor department. Could you tell us about the cooperation between Candu Energy and AECL?

Ala Alizadeh: Candu Energy and AECL maintain a very

close relationship. AECL is the National Laboratory for Canada, and as such, they support many aspects of nuclear research and development. Candu Energy's clients can make use of AECL's specialized test facilities supporting the CANDU platform, including the NRU and ZED-2 reactors.

DPS: Who will be responsible for the maintenance and refurbishment of CANDU's reactors in China (Qinshan Phase 3), Candu Energy or AECL?

Ala Alizadeh: Candu Energy works very closely with our Chinese customer to ensure that the two CANDU 6® reactors in China are maintained and continue to produce safe, reliable, affordable C02-free energy for Chinese consumers.

DPS: Are you dependent on SNC-Lavalin for the NPP project or you can make your own decisions?

Ala Alizadeh: While Candu Energy is a subsidiary of SNC-Lavalin (reporting through the Power division), we have our own executive and our own independent board of directors to provide oversight and direction.

DPS: Do you have a training program for your internal engineers and could you describe it?

Ala Alizadeh: Candu Energy sets aside a certain percentage of its budget every year to ensure that our engineers and other employees are well-trained and can continue to grow and expand their knowledge. In addition, we encourage staff to prepare and present papers at industry conferences to maintain and develop their expertise and share it with the industry.

DPS: What is the role of your representative office in Shanghai (Candu Energy Shanghai Representative Office)?

Ala Alizadeh: Candu Energy believes in the importance of staying close to our customers. Our office in Shanghai ensures that we can be readily available to our Chinese customers and partners.

DPS: What has been the impact of the Fukushima event on Candu reactors? Have you received any new requirements from government departments or your clients?

Ala Alizadeh: Since the Fukushima disaster, the nuclear industry has undertaken many, largely independent reviews to examine the Japanese event and re-assess the safety of nuclear power plants. In Canada, we have performed our own internal reviews and have actively supported reviews of the Canadian CANDU operating fleet. Internationally, Candu Energy has actively participated in many Fuksuhima-related forums and meetings such as the World Nuclear Association, the International Atomic Energy Agency and the European Nuclear Safety Regulators Group to understand the current "lessons learned".

We have reaffirmed that the CANDU reactor design is safe and robust.

Candu Energy has also examined the lessons learned from Fukushima with the objective of implementing further safety improvements in our new Enhanced CANDU 6® (EC6®) design.

In addition to the Canadian regulatory reviews, I would note that the two CANDU 6 units in Romania – Cernavoda 1 and 2 – were reviewed and assessed following the Fukushima event by independent European regulators as part of the European Union Nuclear Power Plant Stress Test. This review resulted in a positive result for CANDU technology.

Control Room

DPS: Candu's EC6 has achieved third and final design review milestones from CNSC. What are the new features of EC6?

Ala Alizadeh: The Enhanced CANDU 6 (EC6) Generation III reactor builds on the experience and feedback gained through the development, design, construction and operation of 11 CANDU 6 units operating in five countries. While retaining the basic features of the CANDU 6 design, the EC6 reactor incorporates innovative features and state-of-the-art technologies that enhance safety, operation and performance. Some of its design features include:

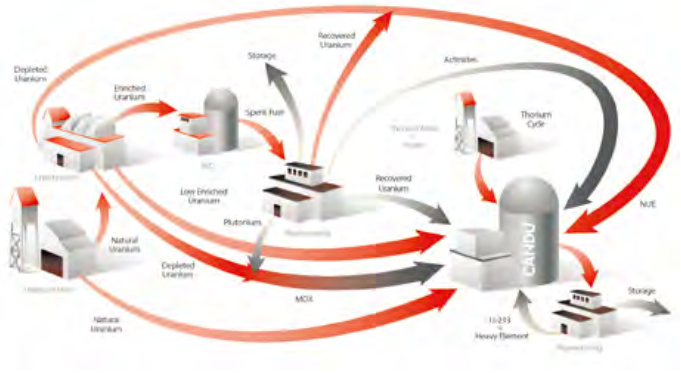
- natural uranium fuel with on-line fuelling
- designed for an annual lifetime performance factor of greater than 92%

- incorporates modern turbine design, with higher efficiency and output
- improved plant operability and maintainability with advanced control room design
- superior safety performance and economics
- very high localization
- suitability for small and medium electric grids

The EC6 is a 700 MWe class heavy-water moderated and heavy-water cooled pressure tube reactor. Heavy water is a natural form of water used as a moderator to slow down the fission chain reaction neutrons in the reactor. It is one of the most efficient moderators and enables the CANDU design to use natural uranium as fuel, which is unique to CANDU reactors. The use of natural uranium increases a country's energy independence as fuel can be manufactured locally, avoiding reprocessing and associated issues.

DPS: The EC6 now joins Candu Energy's ACR1000, which completed the CNSC's pre-licensing design review process in January 2011. Could you tell us more about ACR1000?

Ala Alizadeh: Candu Energy's Advanced CANDU Reactor® (ACR-1000®) is an evolutionary, Generation III+, 1200 MWe class heavy water reactor, designed to meet industry and public expectations for safe, reliable, environmentally friendly, low-cost nuclear generation. The ACR-1000 development program has been completed to the point that the design is ready for bidding or for discussion with interested utilities.



Candu_Fuel-Cycle_DiagramENG_2012

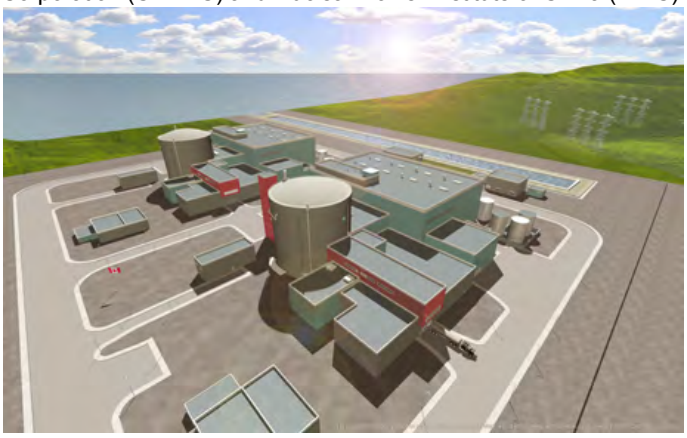
DPS: Do you plan to expand your EC6 reactor into China?

Ala Alizadeh: We are currently in discussions with our Chinese partners to fully develop our Advanced Fuel CANDU reactor (AFCR). Based on the Enhanced CANDU 6 (EC6) reactor, it is part of our family of Generation III 700 MWe class nuclear

power plants, with the evolutionary innovation in the ability to use advanced fuels, including recycled uranium (RU), natural uranium equivalent (NUE) and derivatives of recycled uranium (DRU), as well as thorium.

DPS: Do you cooperate with Chinese nuclear companies?

Ala Alizadeh: Yes. In particular, Candu Energy cooperates with many Chinese nuclear companies, including Third Qinshan Nuclear Power Company (TQNPC), China North Nuclear Fuel Corporation (CNNFC) and Nuclear Power Institute of China (NPIC).



Two-unit Enhanced CANDU 6 Plant

DPS: In April 2013, Mr. Guselle and Dr. Alizadeh came to China to discuss the joint development of Advanced Fuel CANDU reactors, which utilize recycled uranium and thorium as alternative fuels, with Chinese partners. Could you tell me more about this project?

Ala Alizadeh: Thorium is three to four times more abundant than uranium in the earth's crust and is commercially exploitable. A thorium-fuelled CANDU plant would be attractive to countries like China with abundant thorium reserves but with little or no uranium, it can assist in addressing their need for energy self-reliance.

To further the development of recycled uranium and thorium as alternative fuels, in 2012 Candu Energy signed an expanded cooperation agreement with China National Nuclear Corporation's subsidiary companies, Third Qinshan Nuclear Power Company, China North Nuclear Fuel Corporation and Nuclear Power Institute of China. Following our successful demonstration of recycled uranium fuel in operating CANDU reactors at the Qinshan site in 2010, Candu Energy is now working with our Chinese partners on a project to convert the reactor units to full core use of recycled and depleted uranium by 2014.

In late June, Candu Energy provided complete and detailed technical documentation to Third Qinshan Nuclear Power Corporation (TQNPC) to support TQNPC's first full core natural uranium equivalent (NUE) fuel licensing case to the Chinese nuclear regulator. This documentation forms the technical basis for TQNPC to request permission from the National Nuclear Safety Administration (NSSA) to use NUE fuel in the two CANDU reactors in China as a replacement for the natural uranium currently in use.

DPS: A lot of different reactor technologies exist in China and Chinese nuclear companies now pay more attention to AP 1000 and CAP1400, so what is your vision for Candu reactors in China's nuclear market?

Ala Alizadeh: Having designed, built and delivered six CANDU reactors to international customers in the past two decades – all on or ahead of schedule and on budget – Candu has a track record unmatched by any other nuclear vendor. With its evolutionary ability to use advanced fuels, our Advanced Fuel CANDU reactor (AFCR) will hold a special place in China as it is the perfect complement to existing fleets. The spent fuel from three LWRs can be recycled in CANDU reactors to create power from existing resources. We believe this synergistic relationship will be capitalized upon in years to come.

DPS: Will China be your springboard to other Asian countries?

Ala Alizadeh: Yes. Candu Energy is working with its Chinese partners not only on opportunities within China, but also in other markets. In particular, we are in discussions with the Malaysian Nuclear Power Corporation to look into opportunities in that country.

DPS: You have 34 nuclear reactors distributed around world. What new projects are you engaging in?

Ala Alizadeh: We're proud of the CANDU tradition – we have reactors on four continents and help countries provide over 22,000 megawatts of safe, reliable, affordable and CO2-free energy to their citizens. We are currently pursuing opportunities for new build reactors in Canada, China, Romania, Argentina and the UK among others. Our life extension experts are also working with Argentina to prepare to retube the CANDU 6 reactor at Embalse. This will allow the reactor there to operate safely and efficiently for up to another 30 years. And of course, we are continuously working with clients in Canada and abroad on plant life management and maintenance programs.

The 5th Annual
Nuclear New Build China Summit 2013

NUCLEAR
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December 12-13,2013
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——Optimize Nuclear Equipment Supply Chain, Accelerate the Localization Progress of 3rd Gen Nuclear Equipments

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2. Predict and Analyze the Trends of Nuclear Technology Route in China
3. Analyze the Influence of the 3rd Gen Nuclear Technology on the Nuclear Equipment Suppliers
4. Updates on the Latest Localization Progress of 3rd Gen Nuclear Equipments
5. Updated on Nuclear Safety Equipment Supervision System
6. Grasp the Tendency of China's Nuclear Standards and Regulations
7. Seek a Success Way to Explore the International Nuclear Market for Nuclear Equipment Suppliers
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HAF501 Regulations

HAF501 Certifications

RULES FOR THE IMPLEMENTATION OF REGULATIONS ON NUCLEAR MATERIALS CONTROL OF THE PEOPLE'S REPUBLIC OF CHINA

CHAPTER 1 GENERAL PROVISION

Article 1 The present "Rules for the Implementation" is formulated in accordance with the provisions of Article 23 of the "Regulations on Nuclear Materials Control of the People's Republic of China" (hereinafter referred to as the "Regulations".

Article 2 The present "Rules for the Implementation" is applicable to the application, review, assessment, approval, and issuing of nuclear materials licence; to accounting for and control of nuclear materials; and to physical protection of nuclear materials. Concerning the scope of nuclear materials, the present "Rules for the Implementation" is in accordance with Article 2 0f the "Regulations"..

CHAPTER 2 THE RESPONSIBILITIES OF THE NATIONAL OFFICE FOR THE CONTROL OF NUCLEAR MATERIALS

Article 3 The Ministry of Energy authorizes the China National Nuclear Corporation to be responsible for the control of nuclear materials of the whole country, under which an National Office for the Control of Nuclear Materials was established (hereinafter referred to as the "Office"). The Office is responsible for the control of nuclear materials in the concrete.

Article 4 The responsibilities of the "Office "are :

(1) to elaborate the rules and regulations, and specifications for the control of nuclear materials in accordance with "Regulations " and the present rules for implementation ;

(2) to accept the application for licences of nuclear materials and to be responsible for issuing licences of nuclear materials in accordance with the provisions of shall inform the Supervision Section of the NNSA with telecommunication within 24 hours.

(a) When the regional office receives the event notification from the operating organization that affects the nuclear safety besides notifying the NNSA with telecommunication methods as soon as possible, it should submit the written notification of the operating organization and the preliminary assessment comments of the regional office to the NNSA within 24 hours.

(b) The regional office shall inform the NNSA all times about the proceeding conditions of the event that greatly affects the nuclear safety.

(3) Other reports

The regional office should submit the following reports that are made by the regional office or other authorized units by contracts: investigation report, observation report, inspection report, conclusion report etc.

The investigation report, observation report, inspection report and conclusion report made by the regional office or other authorized unit by contract should be submitted three copies to the NNSA within one week after finishing reports.

(4) The Supervision Section of the NNSA is responsible for receiving and analyzing the submitted reports and proposes the handling comments in time which will be implemented after approving by the NNSA.

CHATER 3 THE RESPONSIBILITIES OF THE LICENSEE OF NUCLEAR MATERIALS

Article 5 In accordance with the provisions of Article 16 of the "Regulations ", the legal person for the licensee of nuclear materials is responsible for the overall safety of the possessed nuclear materials.

Article 6 The licensee of nuclear materials must establish a specific organ or designate a specially assigned person who is responsible for the implementation of "Regulations " and the present rules for the implementation. Its concrete responsibilities are:

(1) to elaborate rules and regulations of the unit relating to nuclear materials accounting control and the physical protection, and to be responsible for implementation ;

(2) According to the stipulation of the "Office" to submit the report for transfer, inventory, and accounting and balance of nuclear materials;

(3) to perform the professional training and examination for the personnel, engaging in nuclear materials accounting and physical protection.

Article 7 When accidents of theft, sabotage, lose, unlawful diversion and unlawful use of nuclear materials occurred, the nuclear materials licensee must immediately take measures and reports quickly to the local public security organ, the "Office" and the higher leading body, and writes the accident report.

CHAPTER 4 APPLICATION, REVIEW AND ASSESSMENT, AND ISSUING OF LICENCE OF NUCLEAR MATERIALS

Article 8 For ensuring lawful use and safety of nuclear materials, the State adopts licensing system for nuclear materials in accordance with the provisions of Article 3 of the "Regulations".

Article 9 Unit that applies for the licence of nuclear materials must submit the application for the licence of nuclear materials six months ahead. Units that have possessed nuclear materials must go through the procedures for licence within one year after the present rules for implementation is issued.

Article 10 Required information to be submitted for application of nuclear materials licence :

(1) The application for nuclear material licence (see APPENDIX 1);

(2) The implementation plan for the control of nuclear materials accounting and balance (see APPENDIX 2);

(3) The implementation plan for physical protection and secrecy of nuclear materials (see APPENDIX 3);

(4) Other necessary supporting documents.

The above mentioned documents must be reviewed by the higher competent department before submitting to the "Office".

Article 11 After the "Office" accepted the application of licence, it offers the review comments, and the licence is issued after being reviewed and approved by the National Nuclear Safety Administration or by the Commission of Science, Technology and Industry for National Defence.

Article 12 The stipulations for the period of validity, change and suspension of licence of nuclear materials :

(1) The period of validity for nuclear materials licence is specified in the licence, and the licence will be automatically cease to be in force, when it is overdue. If it is necessary to prolong the period of validity of licence, it must submit the application within ninety days before the licence expires;

(2) During the period of validity of licence, if there are some changes related to the variety, quantity, the scope of application and the implementation plan of control, the licensee must submit to the "Office" the application (see APPENDIX 4) for the change of licence. After reviewed by the "Office", the "Office" makes reply, and reports to the National Nuclear Safeiy Administration and the Commission of Science, Technology and Industry for National Defence for the record;

(3) If there are some significant changes or amendments for the variety, quantity, scope of application and implementation plan of control of nuclear materials , the "Office " has right to notify the licensee for reapplication of licence;

(4) When the licensee requests for the suspension of licence, he submits to the “Office" an application (see APPENDIX 5) for suspending the licence only after he has completed the disposal of nuclear materials. The "Office" examines and reviews, and cancels the licence, and then reports to the National Nuclear Safety Administration and the Commission of Science, Technology and Industry for National Defence for the record.

CHAPTER 5 ACCOUNTING MANAGEMENT OF NUCLEAR MATERIALS

Article 13 The scope of nuclear materials accounting system of the whole country:

(1) Nuclear materials listed in Article 2 of the "Regulations "shall belong to the present accounting system;

(2) The uranium ore and its primary products, i.e. before the products had reached the nuclear grade, the nuclear materials and products transferred to the armed forces, and nuclear materials that are approved to be exempted from registration, do not belong to this accounting system.

Article 14 The transfer of domestic nuclear materials shall be in accordance with the following stipulations:

(1) The transferee must check the licence of the receiver, fill in the "transfer report of nuclear materials" and report to the "Office";

(2) The accumulated amounts of transfer for once or several times are above or equal to the limits, specified in Article 9 0f Regulations, the receiver must also hold the nuclear materials licence;

(3) When transferee and receiver have dispute on the quantities of nuclear materials transferred, the "Office" has right to organize arbitration if it is necessary, both parties may entrust the third party to make the technical verification, the arbitration fee will be paid by the one who loses the lawsuit.

Article 15 For the import and export of nuclear materials the following requirements must be met:

(1) To fill in "Import and Export Report of Nuclear Materials" in advance, and report to the "Office";

(2) Before export of nuclear materials, the transferee is responsible for escorting the nuclear materials in transportation to the freight yard of export port. After import of nuclear materials, the receiver is responsible for receiving nuclear materials from the freight yard of import port. Unit, in charge of handling for import and export of nuclear materials, is responsible for completing the procedures of acceptance at the Customs. The freight yard of the port will be the border line for assuming the safety responsibilities of both parties;

(3) The safety responsibility for transport, after handling over at the export port or before handling over at import port, will be dealt pursuant to the relevant international provisions.

Article 16 Units, possessing the amount of nuclear materials less than the limit prescribed in Article 9 of the "Regulations" shall observe the following provisions :

(1) It needs not to apply for nuclear materials licence, but the unit must complete the formalities of registration for nuclear materials.

When transferring inward or re-transferring outward nuclear materials, the unit fills in "The transfer report of nuclear materials" and reports to the "Office";

(2) Unit possessing nuclear materials shall be assumed the overall responsibility for nuclear materials and must take control measures to ensure the safety of nuclear materials and prevent the nuclear materials against the theft, sabotage and lose,

(3) Observe the State's provisions relating to the protection of radioactive materials, safety disposal and safety transportation;

(4) "Physical Inventory Report of Nuclear Materials" shall be submitted to the "Office" by the end of each year, and it shall state the where-abouts and residue quantities of nuclear materials , and it shall accept supervision, checking and guidance.

Article 17 In accordance with the provisions of Article 9 of the "Regulations", the registration may be exempted for a small quantities of nuclear material products (or products containing a few quantities of nuclear materials) which are recognized harmless to the safety of the State and the people. The categories and quantity limits of nuclear material products, exempted from registration shall be formulated separately by the "Office". The production unit of nuclear material products which are exempted from registration , shall fill in "The transfer report of nuclear material" of the above mentioned part of nuclear materials for the "Office" and reports their sales categories and quantity.

CHAPTER 6 NUCLEAR MATERIALS BALANCE

Article 18 In accordance with the provisions of Article 11 0f the "Regulation", licensee shall establish a material balance system. The licensee shall balance the nuclear materials in his possession.

Article 19 Only after the following nuclear materials are measured and entered into the account, the balance work terminated:

(1) to be consumed in the reactor;

(2) to be trans{erred to other unit in accordance with the prescribed formalities;

(3) to be discharged as the dischargeable waste gas and waste liquid, or to be disposed as the waste no longer valuable for reprocessing . The temporarily stored materials which still have the value for reprocessing, can't be exempted for balance.

Article 20 The licensee must divide the nuclear facilities into separate material balance areas in accordance with their respective features. The balance will be performed according to the classification of nuclear materials, each balance area shall have a complete accounting system and perform the independent material balance.

Article 21 The licensee must establish nuclear materials physical inventory procedures, and its fundamental

requirements are:

(1) conducting a complete and strict physical inventories at least once a year and to conduct physical inventories for such materials as Pu-239, U-233 and enriched uranium with the U-235 abundance greater than 20 per cent at least twice a year;

(2) to prescribed a closing rime for record and report, and to conduct physical inventories during the prescribed time (usually it is at the end of the year);

(3) to establish the physical inventory plan and procedures , and to supervise in the course of inventory;

(4) to ensure the accuracy and reliability of inventories, the following works shall be accomplished :

(a) nuclear materials are classified for inventory according to their varieties and physicochemical forms;

(b) during conducting inventories, the quantities of nuclear materials for all items must be the measured values;

(c) for ensuring the inventory quality strict measures shall be taken for the physical inventory of nuclear materials in equipment and materials for reprocessing ;

(d) the quantities of nuclear materials shall be measured during discharging or disposing the waste gas, waste liquid and waste material.

Article 22 The licensee must establish a record and reporting system, its fundamental requirements are:

(1) the record of nuclear materials accounting must be clear, accurate, systematic and complete, and must be maintained at least for five years;

(2) the accounting control must be systematic, accurate and prompt. Each unit, according to its feature , establishes accounting record form , statistical procedures and internal audit system, and designates a specially assigned statistical person to be responsible for nuclear materials accounting and statistical works;

(3) the licensee, in accordance with the provisions of Article 4(3) of the present rules for the implementation", submits to the "Office " the nuclear materials accounting and balance report.

Article 23 The licensee must establish nuclear materials measurement system its fundamental requirements are:

(1) the measurement system must be perfect and reliable. The accuracy of measurement system must meet the requirements in Tablel;

(2) to supply the accurate data concerning the receive , shipment, storage , loss of nuclear materials, and material balance status, to conduct the error analysis for making a reliable evaluation;

(3) to draw up a material balance measurement program of the unit, its main contents include: the reference substances and standard radiation sources , sampling and sample processing, instrument calibration, measurement methods, record requirements of data and information, statistics processing and the evaluation of errors etc. The measurement program and its amendment must report to the "Office" for record;

(4) measurement personnel must strictly observe the operating instruction of analysis measurement, great efforts shall be imposed to improve the technical competence of measurement personnel, e. g. establishing the technical training and the regular examination system, those who don' t pass the examination, shall not participate in the measurement work.

Article 24 Nuclear materials balance method and evaluation

(1) The nuclear material balance shall adopt closed material balance method, its basic formula is as follows:

$$MUF=BI+A-EI-R-KL$$

Material unaccounted for (MUF) is calculated by subtracting ending inventory (EI) plus removals (R) and plus known loss (KL) from beginning inventory (BI) plus additions to inventory(A)

(2) When MUF exceeds twice its standard error, it is considered that the closed material balance has not reached, and it may be present the loss, theft or unlawful transfer of nuclear materials. In this case the licensee must report to the "Office" and it is requested to find out the cause for the unbalance and the improvement measures must be necessary. The "Office" has right to investigate and to dealing with this matter depending on conditions;

(3) The licensee must calibrate the measurement system, and calculate the practical measurement error of the MUF. When the results exceed the limit standard in Table 1, the licensee must improve the analysis measurement system. The date of being put into effect for the limit standard in Table I was prescribed in the le document.

CHAPTER 7 PHYSICAL PROTECTION OF NUCLEAR MATERIALS

Article 25 In accordance with the provisions of Article 12 of the "Regulations", the unit possessing nuclear materials must take measures to protect nuclear materials and establishes the physical protection system. The level of protection requirements (Table 2) are divided into three categories for security control, according to the type of material, the quantity and harmfulness of nuclear materials. Nuclear materials beyond the protection category must be also strictly controlled.

Article 26 The fundamental requirements for nuclear materials protection in the fixed sites:

(1) persons designated for access to nuclear materials must be examined, and should be rearranged in time to those unqualified persons;

(2) to establish nuclear material physical protection measures, to inspect regularly the implementation of measures, to remove a hidden danger to stop up the weakness and to ensure security;

(3) to establish the specific or voluntary fire-brigade, to establish the fire prevention system, to provide the corresponding fire-fighting equipment and instrument and to perfect the fire-extinguishing measures;

(4) to report to the local public security organ the measures for physical protection of nuclear materials and to consult and coordinate emergency program with the organ.

Article 27 Guard and defence in the fixed sites:

(1) in the category 1 nuclear materials site, there are armed guards, persons use special pass for accessing the site. The non-site personnel are strictly controlled to access. Persons who are really needed in duty to access, must be approved by the competent authority of the unit, and must go through the procedure of registration, then are escorted by the site-personnel to access. The vault shall be performed the system of "double men and double Jock" regime:

(2) In the category 2 nuclear materials site, there are armed guards or there is person who is specially assigned for watching day and night and the access person uses a special pass;

(3) In the category 3 nuclear materials site, there is person who is specially assigned for watching or let the nuclear materials to be put into safety containers;

(4) Security personnel must be strictly trained, equipped with necessary equipment and instrument, and must quickly interfere, stop the malevolent action and promptly report in case of sabotage, plunder and theft of nuclear materials are discovered.

Article 28 Physical barriers in the fixed sites:

(1) In the category 1 nuclear material site, at least two complete, reliable physical barriers shall be established. Vault or special security container must be needed for storing the category 1 nuclear material;

(2) In the category 2 nuclear material site, two physical barriers must be established, of which one is complete and reliable. The storage area of category 2 nuclear material shall be of a 'strong room' or 'solid container' type;

(3) In the category 3 nuclear material site, a complete and reliable physical barrier must be established.

Article 29 The technical protection demands in the fixed site:

(1) In the place and site of the category I nuclear material, the technical protection system formed with alarming and monitoring installations, etc, shall be provided;

(2) In the category 2 nuclear material site, the alarm or surveillance protection equipment should be provided for the vital area.

(3) The alarm must be quickly sounded against the unlawful intrusion, despite of whichever technical protection measures are adopted.

Article 30 The transport security of nuclear materials must meet the following provisions:

(1) The consignor for shipment of nuclear materials is responsible for transport security and working out the transport security program jointly with the authorities concerned of transport, products management, safety protection and public security. The transport security program of category 1 and category 2 nuclear materials must be reported to the local security organ;

(2) The transport of nuclear materials shall be escorted by the specially assigned professional person, besides the transport competent department has separate provisions;

(3) The shipment of category 1 nuclear material is necessary to be accompanied by armed escort;

(4) The security training shall be required for the transport personnel and security personnel, and the security requirements are clearly given. They are not allowed to receive visitors and conduct private communication in the way:

(5) The shipment vehicle or wagon shall be strictly inspected, to start transport with defected shipment instrument is strictly prohibited, and taking on passengers of unauthorized personnel is also strictly prohibited;

(6) The routine time, starting off and the arrived destination of the transport should not be leaked out to persons who have nothing to do with this job, nuclear material code name shall be used for all applications of transport plan and for filling in the waybills.

Article 31 The responsibilities for the persons who escort nuclear materials in transportation:

(1) Before starting off, they must conscientiously check the quantity, serial number, seal of the container, check whether the loading is reinforced and complies with the security requirements and complete the transfer procedures ;

(2) The security conditions of the package must be checked for

the duration of transportation, as well as the loading conditions;

(3) The guards shall strengthen escort during stop over, interchange or handling over;

(4) When accidents or cases of sabotage, theft, plunder occurred on the way, they shall keep intact the scene of accident and at once report to local security organ and higher leading authority and cooperate the department concerned to investigate and deal with the accident.

CHAPTER 8 SUPPLEMENTARY ARTICLES

Article 32 The licensee of nuclear material shall pay the licence credential cost and part cost of administration. The standard of fees will be formulated separately.

Article 33 The issuing unit shall be responsible for the interpretation of the present “rules for the implementation”.

Article 34 This rules for the implementation go into force from the date issued.

Table 1 Limit of Relative Standard Error of MUF of Closed Material Balance on Various Installation

Installation type	σ(MUF) (%)
Uranium enrichment	0.2
Uranium processing	0.3
Plutonium processing	0.5
Uranium reprocessing	0.8
Plutonium reprocessing	0.1

Note: σ(MUF)(%)——The relative standard error of MUF in the whole course of balance, counted by percent of the total amount.

Table 2 Categorization of Nuclear Material Physical Protection

Material F	orm	Category		
		I	II	III
Plutonium	Un-irradiated	2kg or more	10g-2kg	10g or less
Uranium	Un-irradiated, u ranium-235 enriched to 20% or more	5kg or more	1kg-5kg	10g-1kg
	Un-irradiated, u ranium-235 enriched to 10-20%	2	0kg or more	1kg-20kg
	Un-irradiated, u ranium-235 enriched t o less t han 10% (not including natural uranium and depleted uranium)		300kg o r more	10kg-300kg
Tritium U	n-irradiated, counted by quantities of tritium	10g or more	1g-10g 0	.1g-1g
Lithium	Enriched l ithium (counted by quantities of lithium)	2	0kg or more	1kg-20kg

Note: 1. The categorization of uranium and plutonium physical protection is counted by the quantities of element but not by effective kilograms.

2. The categorization of tritium and materials or products containing tritium is counted by the quantities of tritium; the categorization of enriched lithium and materials or products containing enriched lithium is counted by the quantities of lithium (enriched lithium means those lithium with Li-6 isotope content larger than that of natural lithium).

3. The categorization in this list and the protection measures prescribed in the provision of the present “rules for the implementation" is applied to nuclear material itself, bur not including the protection of installation, therefore the existed standard of nuclear installation and its protection category cannot be degraded according to the categorization of nuclear material.

Events Calendar

September

China International Nuclear Power Equipment Exhibition 2013

Date: 2013/09/02-2013/09/04
Add: China International Exhibition Center, Beijing
Contact: Li Shiyou
Tel: 13801178558
Website: http://www.cine010.com.cn/en/Index/

2013 China International Electric Power Equipment and Smart Power Grids Building Exhibition

Date: 2013/09/02-2013/09/04
Add: China International Exhibition Center, Beijing
Contact: Li Shiyou
Tel: 13801178558
Website: http://www.epchina010.com//en/Index/

The 10th China-Asean Expo Special Exhibition Section of Power Industry

Date: 2013/09/03-2013/09/06
Add: International Convention and Exhibition Center, Nanning, China
Contact: Mo Yujuan
Tel: 13517677479
Website: http://www.caexpo.org/

2013 8th Anural Shandong International Industry Fair

Date: 2013/09/16-2013/09/18
Add: Jinan International Exhibition Center
Contact: Liu Huizhen
Tel: 18963097168
Website: http://www.gyz-xz.com/

The 4th Suzhou International Metalworking and CNC Machine Tool Exhibition

Date: 2013/09/23-2013/09/25
Add: Suzhou International Exhibition Center
Contact: Suzhou Glory Exhibitions Co.Ltd,.
Tel: 86-512-62804023
Website: www.metaltechexpo.com/lxwm.asp

14th China International Machinery & Electronic Products Exposition

Date: 2013/09/23-2013/09/26
Add: Wuhan International Exhibition Center
Contact: Xiang Jianlin
Tel: 13207170419
Website: http://www.cwme.com.cn/en/

2013 China Automation Instruments and Measurement Control Expo

Date: 2013/09/26-2013/09/28

Add: Ningbo International Exhibition Center
Contact: Yang Zhen
Tel: 860574-87787583
Website: http://www.aciexpo.com/

Ocotober

The 10th China (Beijing) International Metallurgy Industry Expo

Date: 2013/10/16-2013/10/18
Add: China International Exhibition Center (Beijing)
Contact: Liu Chunli
Tel: 13651168649
Website: http://www.bcime.com/

The 5th Chinese Renewable Energy Conference and Exhibition

Date: 2013/10/24-2013/10/26
Add: China Wuxi Taihu International Expo Center
Contact: He Liguo
Tel: 18061519949
Website: www.crecexpo.com

Shanghai 8th International Petroleum Petrochemical Natural Gas Technology Equipment Exhibition

Date: 2013/10/28-2013/10/30
Add: Shanghai New International Expo Center
Contact: Chen Bin
Tel: 18964077791
Website: http://www.sippe.org.cn/en/index.asp

Asia International Power Transmission and Control Exhibition

Date: 2013/10/28-2013/10/31
Add: Shanghai New International Expo Center
Contact: Ye Jinrong
Tel: 021-5045 6700
Website: http://www.ptc-asia.com/EN/

The 18th China International Exhibition on Quality Control & Testing Equipment

Date: 2013/10/30-2013/11/01
Add: Shanghai Everbright Convention Exhibition center
Contact: Wang Weigang
Tel: 021-65555687
Website: http://www.mat-test.com/openex.asp?id=12

November

China Yiwu International Manufacturing Equipment Expo 2013

Date: 2013/11/19-2013/11/22
Add: Yiwu International Expo Center
Contact: Sun Ting
Tel: 86-10-58280741
Website: http://www.ywmeexpo.com/www/

2013 China Yangzhou International Machine Tool and Die Manufacturing Equipment Exhibition

Date: 2013/11/21-2013/11/23
Add: Yangzhou International Expo Center
Contact: Mr. Yang
Tel: 13914008762
Website: http://www.ly-expo.com/

The 5th (2013) Shanghai International Forge Products Exhibition

Date: 2013/11/28-2013/11/30
Add: Shanghai International Exhibition Center
Contact: Shanghai Aoya Exhibition Co., Ltd
Tel: 021-33518138
Website: http://www.forging-expo.cn

Technical Articles

China's Global Nuclear Reactor Ambitions

By Yun Zhou, Christhian Rengifo, and Jonathan Hinze, The Ux Consulting Company, LLC

China's nuclear industry has seen significant growth over the last decade. This growth has been especially visible in the number of reactors that China has built and is currently building, and the supply chain that has been developed to support this rapid reactor expansion program. Despite the Fukushima accident and a reduction in China's planned installed capacity by 2020, the government still views nuclear energy as an important element of the country's energy mix and foresees the construction of many more reactors over the coming decades. Also, with the support of several international partners, China is making progress in localizing the manufacturing of various Generation III reactor components. These include not only the manufacturing of heavy components, but also other critical equipment, such as instrumentation and control (I&C) technology. For the future, China expects to develop its own Generation III technology for deployment in China and also abroad.

Current progress in its domestic nuclear energy development has led China's leading nuclear companies to consider exploring participation in reactor projects outside the country. China took a first step in this regard as it supplied two CNP-300 reactors of Chinese-design to Pakistan and is currently building two additional CNP-300 units in Pakistan. Although these units are only Chinese nuclear reactor exports so far, it shows that China has reached a level of technological development that allows the country to completely manage an overseas nuclear power plant project.

Currently, Chinese companies are interested in projects in which they would have to compete with other companies. Moreover, not only nuclear utilities, such as China General Nuclear Power Corporation (CGNPC) and China National Nuclear Corporation (CNNC) are exploring these possibilities, but also other financial interests are interested in projects abroad. This leads one to wonder about the type of participation that Chinese companies would like to have in international nuclear reactor projects. Chinese companies may envision becoming suppliers of nuclear components, nuclear energy related service providers, financial investors, or suppliers of complete NSSS (nuclear steam supply systems). This last possibility would put China on equal footing with other countries that have developed into international NSSS suppliers, such as South Korea.

Why Does China Want to Go Global?

First and foremost, Chinese state-owned and private companies are looking for resource-related assets, mergers, acquisitions, and other investments all over the world, and this has manifested itself in data showing that Chinese overseas investments have increased in the past decade. State-owned companies make the most of China's investment overseas as they enjoy government support in the form of, for example, bank loans. Some of the reasons for China to go global include ensuring natural resources from overseas sources, access to technology, and enhancing its political influence. These investments are possible due to China's strong financial position.

Considering the specifics of Chinese international nuclear reactor objectives, it appears that one of the main drivers is China's interest in becoming a global nuclear industry leader. Several years ago, China's government included nuclear energy as one of the main five industries that it would support as the country's economy moves from basic manufacturing to high-tech industrial development. Moreover, nuclear reactor exports and involvement in overseas nuclear projects would provide excellent avenues in increasing China's global stature and its economic position on a world stage.

China's Interests in International NPP Projects

As noted, China has shown interest in participating in various international nuclear energy projects. In some cases, Chinese companies have expressed plans to work jointly with other international partners, but in other cases Chinese companies have put forward their business cases on their own.

First Step: Pakistan

China's first nuclear reactor export was to Pakistan where two 325 MWe units of the CNP-300 design are currently in operation at the Chasma nuclear power plant. Chasma Unit 1 started operations in 2000 and Unit 2 in 2011. This export was based on China's experience in the construction of the Qinshan Phase I Unit 1 reactor. Furthermore, construction of two additional units started at the Chasma nuclear power plant in 2011

(Units 3 & 4), which are also CNP-300s. In addition to these units, CNNC is interested in supplying a 1,000 MWe reactor to Pakistan although it is unclear which design this would be (possibly CNNC's new Generation III design, the ACP-1000).

Looking for New Markets

In addition to Pakistan, Chinese companies are interested in nuclear power plant projects in North America, Europe, South America, and the Middle East. In this context, China has nuclear cooperation agreements with at least sixteen countries, including Argentina, Belgium, Brazil, Canada, Egypt, France, Germany, Iran, Japan, Korea, Pakistan, Russia, Switzerland, Vietnam, UK, U.S., and, most recently, with Saudi Arabia.

Concerning Chinese interest in overseas projects, in most cases, only talks have been held, and no concrete results have been achieved. The most promising near-term opportunity is Turkey's plans to build a nuclear power plant at a third site. While much longer term in nature, there are also good opportunities for potential Chinese involvement in nuclear power projects in the U.S., South Africa, UK, Romania, and Argentina, among others.

Is China Ready?

When thinking about China's participation in international nuclear projects, one could envision different scenarios for this to happen. China could, for example, be an investor in overseas projects and provide the necessary funds for successful implementation. Furthermore, due to the engineering and manufacturing capabilities that China has gained based on technology transfer of various reactor designs, Chinese companies could provide nuclear components and engineering services to projects abroad. Finally, Chinese companies could endeavor to be full suppliers of NSSS and manage a whole project, as it did in Pakistan.

Financial Participation

Both major Chinese nuclear utilities – CNNC and CGNPC – along with the State Nuclear Power Technology Corporation (SNPTC) have shown interest in overseas projects. These companies have several reactors in operation and under construction in China. For overseas projects, these companies would most probably enjoy the support of the Chinese government to facilitate their work. Therefore, it appears that financial aspects would not necessarily be a constraint for the participation of these companies in overseas projects. It is likely that similar to projects in Turkey or the UAE, these companies will enjoy strong support from their governments. It is also important to note that the slower pace of reactor construction in China has freed up some of these companies' cash.

Manufacturing

For Generation II reactor technologies, China's nuclear equipment manufacturing sector can basically provide all key equipment for nuclear steam supply systems for reactor vessels, steam generators, coolant pumps, and piping. For instance, in CGNPC's Hongyanhe Phase 2 projects, the localization rate for key equipment is at least 85%, and the overall localization rate is no lower than 70%. All key equipment in the NSSS are provided by local companies such as China First Heavy Industries (CFHI), Erzhong, Shanghai Electric Company (SEC), Shenyang Blower Works Group Corporation, Dongfang Electric Company (DEC), Jiangsu Shentong Valve Company, Dalian DV Valve, CNNC Sufa Technology Industry, and others. These companies are responsible for major component forgings and manufacturing, as well as coolant pumps, piping, and valves.

For Generation III reactor technologies, China is still in the process of localization, but it has already localized most of key components and equipment. CFHI localized the AP1000 reactor pressure vessel manufacturing for Sanmen Unit 2. Harbin Electric Corporation (HEC) and SEC manufactured steam generators for Sanmen Unit 2 and Haiyang Unit 2. SEC and DEC manufactured the pressurizer for Sanmen Units 1 & 2 units and Haiyang Units 1 & 2. Shandong Nuclear Equipment Company has supplied steel containments for Sanmen Unit 2 and Haiyang Units 1 & 2. However, other components for the AP1000, such as reactor internals, control rod drive mechanisms (CRDMs), and coolant pumps are still under R&D programs or under development through international cooperation.

Overall, China can develop and manufacture most of the key components and equipment, and experts believe that within a few years, all major equipment and components could be manufactured locally and could be also be exported for projects overseas.

NSSS Technology

It is important to note that China sees South Korea as a role model to develop its nuclear power industry and become an international player. Before the Fukushima accident, China was planning to export its Generation II+ reactor design. However, the Fukushima accident showed the weaknesses in these designs. Therefore, China decided to speed up work towards technologies that use passive safety features. Under the current plan, China aims to develop its own Generation III reactor

designs to be able to compete in the international market.

Currently, CGNPC, CNNC, and SNPTC are all working on their own respective Generation III designs. CGNPC's ACPR-1000 is developed based on CPR-1000 which is originally based on AREVA's M310 reactor. The ACPR-1000 design is being used for the construction of Yangjiang Unit 5, which just started preliminary construction in March 2013. To the best of UxC's understanding, there may be potential disputes over intellectual copyrights and these may complicate any intentions of using the ACPR-1000 for exports.

CNNC's ACP-1000 is developed based on the CP-1000, which is originally based on the CNP-600 design (this design was used in the second phase of the Qinshan nuclear power plant) and it should not experience any issues over intellectual copyrights. CNNC intends to build the first ACP-1000 units at Fuqing 5 & 6, with possible start of construction before the end of 2013.

SNPTC's is working on the CAP1400, which is derived from Westinghouse's AP1000. SNPTC claims full intellectual copyright over this design; however, Westinghouse may dispute this. The design work is now finished, and construction on the first CAP1400 project should start in 2014 at the Shidaowan site. Among the three mentioned designs, the CAP1400 has the best chances for export in the near future. However, due to its likely lower costs, the ACP-1000 could also be an attractive option for some countries.

Timing for Exports

CAP1400's design work is already done and feasibility studies are being prepared to apply for a construction permit this year. Construction could start this year as well, but delays are always possible. If we take South Korea as an example, KEPCO sold its APR-1400 design to the United Arab Emirates (UAE) in 2009 when the first APR-1400 was still under construction. South Korean authorities approved the APR-1400 design in 2006, and the first unit in South Korea obtained a construction permit in 2008. If we take this as an example of what could happen in China, the CAP1400 could be ready for export in the next 3-4 years. China could also apply for U.S. NRC design certification to strengthen marketing efforts for the CAP1400 design. Similar timing may apply to both the ACPR-1000 and ACP-1000 depending on the success of domestic licensing and first deployment projects in China.

Analysis

The Fukushima accident impacted China's nuclear industry significantly as the country's new reactor approval process was delayed for about 18 months. In addition, the new Chinese nuclear power safety plan outlines the rapid shift from Generation II+ to Generation III technologies. From now until 2016 (i.e., the 12th Five Year Plan), only domestic Generation III, Generation IV, imported reactor designs, and very few Generation II+ units will be built.

Due to this shift in reactor designs (i.e., away from Generation II and II+), the pace of the Chinese nuclear program will be slower than expected before. As China's nuclear industry cannot invest more financial resources in domestic projects as planned, the main nuclear utilities are seeking overseas investment opportunities. CGNPC has a good financial position, which makes it very active in seeking overseas business opportunities. If Generation II+ were accepted in overseas markets, CGNPC would have the capability to work on such projects.

However, only Generation III technology has the best chance for deployment overseas, and, under the leadership of SNPTC, China has been working on assimilating the Westinghouse AP1000 design to eventually have its own CAP1400. Compared to designs finalized by CNNC and CGNPC, the CAP1400 likely has the best chance for export, except for in unique cases like Pakistan. The next couple of years will be crucial for China's nuclear industry to be able to participate in international projects as a NSSS supplier. The successes of the AP1000 construction projects, the CAP1400 demonstration project, and Generation III equipment R&D and technology transfer programs are indispensable to ensure China's goal to be a competitive nuclear exporter. In the meantime, we may see the first Chinese participation in international reactor projects as a financial partner or in some other support role.

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Pressing the Perfect Fuel Pellet

By Tonie Van Zegbroeck

(1) Introduction

Since 1969, Belgian tablet press manufacturer Courtoy, now a GEA company, has supplied slugging and pelleting technology to Uranium Dioxide and MOX nuclear fuel factories. With the Courtoy™ brand accounting for a global market share in nuclear fuel tablet presses of over 90%, GEA has strong connections with fuel plants all over the world allowing it to keep abreast of new needs and evolutions within the industry. In the past, fuel pellets were produced on hydraulic single-stroke presses. This technology had quite a few drawbacks, including low output performance, risk of oil spillage; uneven die filling and frequent interruptions to the powder flow. Finding this unacceptable, the Courtoy™ tablet press design team took the lead in improving and transforming the pellet compression process.

(2) Primary equipment performance requirements for UO2 (Uranium Dioxide) pellet presses

The primary equipment performance requirement is to produce consistently flawless pellets within the specified narrow density band and length limits whilst minimizing the density gradient in the product. The purpose is to minimize grinding of the sintered pellets and to reduce defective samples.

To fulfil these requirements:

the die needs to be filled consistently,

the compression force on the upper and lower punch needs to be equal and constant,

the powder needs lubrication or a lubrication film has to be applied to the die wall before powder filling,

during the ejection, the pellet has to be kept under a load avoiding pellet end capping,

after ejection, the pellets need to be lined up for transfer into boats going into the sintering furnace.

Below is a brief outline of the innovative Courtoy™ solutions to these challenges.

2.1 Die filling

Over the years, Courtoy™ engineers have developed different powder feeding mechanisms in cooperation with customers. Because of the high density, the head pressure in the feeder varies during the emptying of the powder container, which significantly influences the powder quantity in the die. The newly-developed Courtoy™ powder dosing valve keeps the head pressure in the feeder constant during the emptying of the container, thus avoiding continuous reactive correction of the press control system. A closed double-paddle forced feeder enables consistent die filling and minimizes the amount of powder circulating on the turret, which improves containment.

2.2 Constant density compression

An air compensator, a feature exclusive to Courtoy™ tablet presses, is connected to both top and bottom compression roller and functions as a cushion. During every pellet compression cycle the rollers travel a few tenths of a millimetre making sure that every compression is performed at the set compensator pressure and force. Every pellet will be pressed to equal density and height variations will reflect differences in die fill and powder property variations.

2.3 Control of pellet density and length tolerances

2.3.1 Pellet volume-based press control system

Until recently, Courtoy™ tablet press control systems for fuel pellets were based on safeguarding a constant volume at a constant compression force. When pressing pellets at a constant compression force, the pellet length is proportional to its weight. The pellet length is defined as the fixed distance between the punches at the compression position, increased with bottom and top compensator displacement and corrected with bottom and top punch embossment. When the pellet length changes, e.g. by inadequate die filling, the powder dosing cam position will be changed until the sum of bottom and top compensator displacements are back to the nominal value. Granule density can change across the powder batch demanding press setting adjustments. In the above described press control system, the operator had to bypass the automatic control mode and adjust compression force by changing the top and bottom compensator pressure, repeatedly pressing the +/- button until the density was again within the predefined limits. This approach resulted in occasional pellet wastage. In automatic mode, changing the compression force would imply changes in compensator displacement, which would activate the above described dosing cam control loop with pellet length changes as a result.

2.3.2 Constant density press control system

Manual density input

The new Courtoy™ density control system allows the pellet density to be dialled into the press control system by the operator after he/she has measured and weighed a couple of tablets and calculated the pellet density. The control system

will then correct the compression force in a much faster way than the operator can without affecting the compensator displacement.

Automated density input

An automated density sampler can be installed after the pellet take-off wheel but still within the enclosure of the press. This sampler is for measuring the heights and diameters of each pellet and weighs about 20 units per minute. The pellet dimensions and weight are used to calculate its true density. This data is continuously fed back to the press control system for pellet density and length adjustments if the correction thresholds are crossed. All this information is stored in a database for batch validation and is also used for displaying trending graphs and histograms. The data of a tablet is also linked to the press position on the turret, allowing the detection of any defective punch tips.

2.4 Pellet ejection

During compression a significant amount of the compression force is transmitted to the die wall. Stick slip movement can occur during ejection if the die wall is not lubricated sufficiently. Two solutions are available to prevent this: either a lubricant is blended into the powder or a lubricant is deposited on the die wall by the lower punch, in the form of a controlled thin oil or grease film. This film is deposited by the lower punch between the ejection and the overfill position. In both cases the lubricant is burned out during the sintering process. As the tablet is coming out of the die it will expand as the die wall is falling away. To avoid end-capping a hold/hold up force is applied that is gradually reduced as the pellet comes out of the die.

(3) More primary requirements for MOX pellet press

In addition to the above primary requirements, which apply for MOX pellet presses as well as UO2 presses, MOX pellet presses have to meet three further crucial requirements:

full containment of the compression zone,

minimized operator intervention,

absence of all fast decay plastics.

3.1 Full containment

The compression zone has to be fully sealed from the mechanical press areas using seals and Hepa filters for dust collection. The press shell is replaced by a glove box for operator interventions. Rapid Transfer Ports (RTP) have to be provided for the transfer of parts and tooling. Maintenance within this glove box has to be minimized by placing a maximum number of motors and sensors outside.

As well as the press, the powder in-feed and the pellet exit also need to be contained. Intermediate Bulk Containers (IBC) equipped with split butterfly valves for contained docking and undocking can be proposed. These IBCs can also be used in tumblers for lubricant blending and can be positioned, using a post hoist, above the press.

3.2 Minimized operator intervention

Because of handling limitations within a glove box, the changeover parts should be easily removable. The glove box design must allow easy access to all intervention points taking the weight of the removable press parts into account.

3.3 Absence of all fast decay plastics

All plastic lubrication tubing is to be replaced by stainless steel tubing.

(4) Secondary equipment performance requirements

Besides production output and powder containment, press reliability, robustness against the abrasive powder and the press life cycle are all important issues. With these requirements in mind, the proven long lifespan of Courtoy™ machines and the services provided by Courtoy™ Customer Care are key assets.

4.1 Lifetime and spare parts

As the disposal cost of a press is quite high, the machine's lifetime is an important aspect to consider when purchasing. The first Courtoy™ rotary press ever delivered to the nuclear industry in 1969 is still in operation at Cameco Canada as a slugging press. Spare parts are still available for all nuclear presses that have ever been delivered and at this time availability of spare parts are guaranteed for 20 years, after which some of the electronic components may become obsolete and, therefore, a control system upgrade will be required.

The R53 press is being redesigned to improve access to the base of the press and reduce the number of different spare parts. The compression process has not been changed.

4.2 Customer Care service

The Courtoy™ Customer Care team at GEA counts among its experts a number of nuclear press specialists who can assist customers with press installation, training, repairs and preventive maintenance.

(5) Specific requirements for manufacturing of pellets with a central hole

Pellets with a central hole are made using a core rod held and centred by the lower punch. During the complete compression cycle the core rod remains flush with the die table surface. Whilst filling, the powder flows around the core rod into the die. Occasional powder remains on top of the core rod get wiped off by a scraper blade. A top punch with a central hole closes off the die and the pellet is compressed. Core rod material properties and surface finish must be carefully chosen to avoid the core rod rupturing during pellet ejection.

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Asian growth to boost global energy demand

World energy consumption will increase by 56% between 2010 and 2040, according to the US Energy Information Administration. Nuclear power generation is expected to double over that period, but coal will remain the dominant fuel for electricity.

Newly released highlights from the reference case in the EIA's International Energy Outlook 2013 suggest that total world energy use will increase from 524 quadrillion British thermal units (Btu) in 2010 to 820 quadrillion Btu in 2040.

Most of that growth will occur in Asian and Middle Eastern countries outside the OECD: total energy demand in non-OECD countries is seen to increase by 90% by 2040. India and China together will account for half of this growth up to 2040. Energy use in OECD countries, meanwhile, is expected to increase only by 17%.

"Rising prosperity in China and India is a major factor in the outlook for global energy demand," said EIA administrator Adam Sieminski. "This will have a profound effect on the development of world energy markets."

Electricity output

World electricity generation is set to grow by 93% from the 2010 level to 39,000 TWh by 2040, according to the EIA - the statistical and analytical agency of the US Department of Energy. The fastest growing sources of world energy are renewable (including hydro, wind and solar) and nuclear power, each of which is expected to grow 2.5% annually between 2010 and 2040.

World electricity generation by fuel, 2010-2040 (Image: EIA)

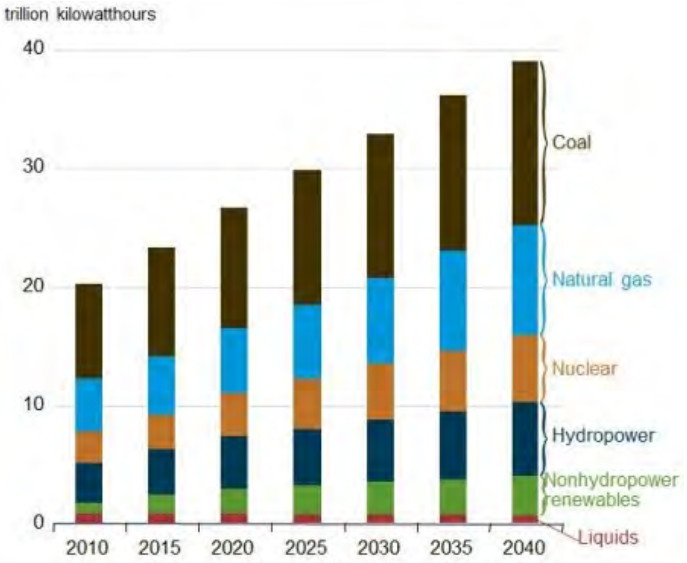
Electricity generation from nuclear power plants is forecast to increase from 2620 TWh in 2010 to 5492 TWh in 2040. Substantial increases in nuclear generating capacity are projected, including 149 GWe in China, 47 GWe in India, 31 GWe in Russia and 27 GWe in South Korea. However, nuclear's share of global electricity production will only grow from 13% to 14%.

The share of renewable, meanwhile, is forecast to increase from 21% in 2010 to 25% in 2040, while the natural gas share will grow from 22% to 24%. The coal-fired share will drop from 40% to 36% as countries move to cleaner sources of energy.

"The outlook for coal, however, could be altered substantially by any future national policies or international agreements aimed at reducing or limiting the growth of greenhouse gas emissions," the EIA suggested. However, coal will remain the single biggest fuel source for electricity production up to 2040.

"Given current policies and regulations limiting fossil fuel use, worldwide energy-related carbon dioxide emissions rise from about 31 billion tones in 2010 to 45 billion tones in 2040, a 46% increase," the EIA said. It noted that coal will continue to account for the largest share of these emissions.

Source: World Nuclear News



CGN advanced solid waste treatment technology fills the gaps in China

On August 2nd 2013, CGN China Nuclear Power Technology Research Institute (CNPTRI) held an expert acceptance meeting on the research project of “NPP plasma fusion and volume reduction technology” in Changsha. This spike research plan was accepted by the expert group from seven research units, including the China Institute of Atomic Energy. At the meeting, the experts listened carefully to the report, reviewed the R & D

information, inspected the entire testing system and witnessed the plasma fusion experiment together. They believed that the technology research and development of the project has been completed and agreed to accept it.

The plasma fusion and volume reduction technology benefits from thermal plasma as it possesses characteristics of high temperature and energy density to complete a fast pyrolysis of the waste. Its product is inorganic glass and the gas generated by the reduction reaction under high temperature decomposes into atoms and simple molecules. One of the most important effects is that the toxic organic compounds, especially dioxins and furans are completely decomposed into non-toxic small molecules. If used in nuclear power plants, the radionuclides contained in the low level radioactive solid waste will be completely encapsulated in the glassy slag and the product will be in an inorganic stable state. The plasma volume reduction technology has the advantages of high volume reduction ratio, product stability and no secondary pollution and has been internationally recognized as one of the advanced treatment technologies of radioactive solid waste.

This technology has been practically applied in plants abroad, but not in China. In 2009, CNPTRI undertook the project and become the first company to carry out the technology research and development. During three years of independent research and development, CNPTRI grasped the full set of core solid waste treatment technology including the plasma generator, melting furnace, the glass formulation and gas treatment.

This acceptance also marks that the first set of plasma fusion and volume reduction systems has been officially set up in China.

Source: http://www.cgnpc.com.cn

Nuclear power "going out" should be a national strategy of China

After nearly 30 years of development and maturing, China now possesses a complete industrial chain and has its independent intellectual property brand of nuclear power. The nuclear power industry in domestic China has also fully realized the importance and urgency of the "going out" of nuclear power and calls for it to become a national strategy.

The prerequisite for nuclear power "going out" is to have an independent intellectual property brand. Now the CAP1400, developed by State Nuclear Power Technology Corporation (SNPTC), meets this condition. CAP1400 is an advanced third generation nuclear power technology brand with Chinese independent intellectual property rights. It has the advantages of being advances, safe, economical, reliable and gives high environmental protection. The third generation passive advanced technology has strong construction capacity, equipment manufacturing capacity and the investment and financing capacity of Chinese industries. It not only has the advanced Chinese concept, but has also accumulated strong international advanced technology and core elements of becoming a national and international brand. According to the progress of major projects and demonstration projects, China National Development and Reform Commission has approved the preliminary work of the CAP1400 demonstration project. This project plans to have its first concrete poured in 2014 and be put into operation by the end of 2018. Meanwhile, CNNC and CGN are also actively developing their own nuclear power brands.

China has more export advantages than other countries since it has the whole nuclear industry chain's service capabilities and lower construction and service costs. Some countries that plan to develop nuclear power have demonstrated strong interest in the million-kilowatt nuclear power plant in China. At present, three of China's major nuclear groups have showed strong will to export and all of them are getting ready to enter the international market. In light of this, to have the nuclear power export rise to national level will help to integrate the domestic industrial resources and strength and avoid the formation of domestic enterprises' efforts being fragmented and mutually competitive.

Now the three major groups have realized the "going out" strategy cannot be operated without strong government support. Overseas experience shows that support from the government and heads of the state are inseparable if one wants to win nuclear power orders from abroad. At present, the three nuclear power groups and the equipment suppliers should make efforts to push Chinese leaders forward to include the nuclear power cooperation into their agendas and implement the "going out" strategy as soon as possible though various channels and utilize China's political, economic and diplomatic influence comprehensively.

In addition, they should fully understand and utilize the important role of embassies and consulates to collect information of the nuclear power demand in the host countries. It is suggested that the nuclear power countries should strengthen ties with

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Our Expertise:

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We deliver invaluable local market knowledge, know-how and operating expertise within China. This provides our clients with a cost-effective, low-risk/high-gain market entry capability into China's Nuclear Power Industry.

Our Services:

- Lobbying – We establish long-term relationships with the main holdings (CNNC, CGNPC, SNPTC) and other operators (CPIC, Huaneng, Datang) while also operating alongside the procurement departments of the engineering companies and the research and design institutes - in particular CNPE, CNPEC, SNERDI , SNPEC and NPIC.

- Sales representation – We assist our clients to sell their technology to Chinese firms, and enhance sales action during the bidding and negotiation processes.

- Sourcing – We undertake groundwork for negotiating long-term contracts with Chinese component manufacturers in order to source for our nuclear power clients worldwide. We also provide our clients with the ideal platform for localization of nuclear based products

For more information contact us: info@dynabondpowertech.com
http://www.dynabondpowertech.com/en/service/sales-representative

the embassies and consulates and strive to form the annual record in the offices of commercial counselors and establish a showcase of China's nuclear power technology. Daily communication and cooperation from the aspect of nuclear power should also be carried out between the embassies and Chinese nuclear power enterprises and then gradually form a long-term mechanism.

Source: http://news.bjx.com.cn

China's first localized residual heat removal pump for CPR1000 is delivered by SBWG

On August 6, China's first localized CPR1000 project of residual heat removal pumps—the ones for Hongyanhe NPP unit 3—were successfully manufactured and delivered from Shenyang Blower Works Group Nuclear Power Pumps Corporation (SBWG). Each performance indicator of the product has reached the international advanced level. The product is of great importance during the nuclear localization process of safety level pumps.

Source: http://www.lhnp.com.cn

Two research projects for large-scale advanced PWR pass pre-acceptance

Major special research projects have passed pre-acceptance in Shanghai. They are large-scale advanced pressurized water reactor on "AP1000 nuclear island major key design technology" and "AP1000 nuclear island key equipment design technology research".

The pre-acceptance group was made up by the academician of Chinese Academy of Engineering, Ye Qizhen, Chief Engineer of China Machinery Industry Federation, Sui Yongbin and more than 20 well-known experts in nuclear power technology. The group agreed that both of the two issues have achieved their expected objectives and content of the mission statement of contract, and completed the required assessment indicators. This indicates that China has mastered the technology system for the third-generation international advanced nuclear island design, and has already had its own design capability of AP1000 nuclear island.

The major PWR projects include the AP1000 technology digestion and absorption, CAP 1400 technology research and development, CAP1700 technical pre-research, PWR common technology and condition security. These two topics that have passed the pre-acceptance belong to the topic of AP1000 technology digestion and absorption with 15 sub-topics and 55 special subjects, and 1,700 copies of technical documentation. Now the technology innovation achievements have been used on AP1000 follow-up project and part of the AP1000 relying project.

Source: http://www.cfhi.com

CDB loans 16 billion RMB to support construction of Tianwan NPP

On August 12, China Development Bank (CDB), Jiangsu Branch signed a loan agreement with Jiangsu Nuclear Power Co., Ltdon Tianwan NPP phase two projects, it took the lead in providing substantial financial support in the financial industry. Under the agreement, CDB Jiangsu Branch of Jiangsu province will provide about 16 billion RMB of loans for the construction of Tianwan NPP's second phase.

The support for Tianwan NPP provided by CDB dates back to as early as 1999. At that time, the phase one engineering of Tianwan NPP had just starte dconstruction, Jiangsu Branch of CDB, as a main financing bank, took the first opportunity to provide 4.5 billion RMB of the long-term loans for Tianwan phase one.

Source: http://www.chinabidding.com

Fuel components plant at HTGR NPP demonstration project completes capping

The newly-built fuel components plant in Baotou has finished capping its HTGR demonstration project. This demonstration project is a major science and technology project of China's national "11th Five-Year Plan". It was financed by China North Nuclear Fuel Co., Ltd with a total investment of RMB 275 million. The company plans to construct a components production line with an annual output of 300,000 spherical fuel components for the NPP demonstration project on HTGR modular of 200,000 kilowatts. This production line is planned to start trial production in October 2015 and will be put into commercial operation in 2016.

Source: http: //www.china-nea.cn

China develops ITER superconducting cable conductor

On August 16, a 765 meter CB superconducting cable conductor left the assembly line in Changtong Cable Co., Ltd, under live site supervision of officials from the International Thermonuclear Experimental Reactor (ITER). This is the longest superconducting cable in the ITER.

In Janurary 2003, the Chinese government formally participated in the negotiations on the ITER project and become a member of the co-operation of the scheme. Under the agreement, China will bear 70% production of the tube conductor.

The superconducting cable is a core part of the superconducting cable for the ITER devices. According to the certain twisted parameters, the cryogenic superconducting material of 0.73 mm diameter and single metal wire will be twisted into 5 multi-conductor levels. "The parameters of every level must be uploaded to the ITER then analyzed and confirmed by project officials", said Li Yingzi, Senior Engineer of Changtong Company.

This new cable conductor material will soon be delivered to the Institute of the Chinese Academy of Sciences in Hefei and sent to ITER's French headquarters for installation after the tube wearing.

Changtong Cable Co., Ltd is the backbone of China's wire and cable industry. Various types of high-temperature superconducting cables developed by this company have been successfully applied in aerospace, new energy and basic research areas such as physics. This year, four PF5 model CB cable conductors have been provided to the ITER and all have been assembled to run.

Source: http://www.cnnc.com.cn

There are no essential differences between Inland and coastal nuclear power

Inland nuclear power plants account for about 50% of the global 442 nuclear power units in operation. Among them, the United States has a total of 104 units of which 88 units are inland, accounting for 84.6% of all nuclear power plants of the US; France has 59 units, of which 41 are inland, these account for 69.5%; Russia has 31 nuclear power units of which 58 % are inland; All 19 units in Ukraine are inland.

There is no essential difference in the requirements for nuclear power plants between the Inland and coastal developments at home or abroad. Regardless of the IAEA, the requirements of China the major nuclear power countries on nuclear safety regulations have identical safety objectives and evaluation criteria for nuclear power plants in coastal and inland areas. No countries or organizations have raised unusual special requirements for inland nuclear power.

Special attention needs to be paid on the construction of inland nuclear power plants due to different environmental conditions, mainly: discharge control of the liquid radioactive effluent emissions, population distribution and the feasibility of implementing emergency plans, cooling system operation, large transport conditions, waterproofing and safe plant with water settings.

As long as these issues have been thoroughly evaluated and appropriate management and technical measures have been taken during the siting stage, plant sites can be selected which are fully capable of meeting the conditions of the relevant regulations and requirements.

Source: http://www.cni23.com

NPP personnel gates prototype passed identification

On August 16, 2013, the "independent passive series nuclear power plant personnel gates prototype "passed the results identification in Dalian, organized by China Nuclear Energy Association. The identification results showed that the personnel gate prototype has independent intellectual property and has reached the international advanced level. The results can be applied to the CAP series and other nuclear power projects.

This gate prototype is a sub-topic of major national projects, which is jointly held and carried out by Shanghai Nuclear Engineering Research and Design Institute of Dalian Baoyuan Nuclear Equipment Co., Ltd. The subject has combined with Westinghouse's technical requirements and practical engineering experience, following the national standards and ASME standard, and has completed prototype design and manufacturing, and carried out various tests.

Source: http://www.china-nea.cn

Company News

A fuel research and design institute is set up at NPIC

On August 1st, the Fuel Research and Design Institute of China Nuclear Fuel Corporation Limited was set up at the Nuclear Power Institute of China (NPIC). Its purpose is to further play the system-based advantages of CNNC on design, test, key materials, irradiation testing and manufacturing processes in the field of nuclear fuel components; push forward scientific research of fuel components promptly applying it to the industrial applications; improve the group's core competitiveness in this field and then further promote the development industrial technology for China's fuel components.

It is reported that the nuclear fuel research and design institute is run by China Nuclear Fuel Corporation Limited, and includes a fuel R&D department, off-heap fuel laboratory, fuel irradiation testing chamber, fuel element material research room, fuel manufacturing technology laboratory and other departments. It has gradually formed its self-owned brand and realized industrial development mainly through taking on related technology research projects, engineering tasks and engaging in international cooperation and exchanges, the design technology of the fuel components and R & D of key materials.The opening ceremony was attended by the Deputy Chief Engineer of CNNC and Party Secretary of the China Nuclear Fuel Corporation Limited, Li Guangchang, leaders from CNNC Jianzhong Nuclear Fuel Co., Ltd, China North Nuclear Fuel Co. Ltd and NPIC,.

Source: http://news.bjx.com.cn

CNNC attended the opening ceremony Source: CNNC

Neway has signed an agreement with SNERDI on jointly developing a third-generation nuclear power prototype

On July 26, 2013, the signing ceremony was held in Suzhou on the joint development of significant valve R & D for the third-generation advanced nuclear main steam safety valve and CAP series of safety valves. It was held at the Neway Valve and Shanghai Nuclear Engineering Research and Design Institute (SNERDI). The President of SNEDRI, Zheng Mingguang, and Vice President of SNEDRI, Gu Guoxing, and the President of Neway, Wang Baoqing, attended the signing ceremony.

The CAP series of nuclear power technology is advanced and has independent intellectual property rights. It has been re-innovated by SNERDI on the basis of the digestion and absorption of Westing house's third-generation AP1000 nuclear power technology, which is the most advanced in the world. Neway Valve will rely on the nuclear power technical support and services of SNERDI to develop the international advanced level CAP series of main steam safety valves, safety class one electric gate valves, safety class one swing check valves and safety class two pneumatic ball valves. It will further expand the product qualification range of Neway safety valves; enhance the level of product technology and quality and its competitiveness in the nuclear power valve market.

Source: http://www.valve-world-asia.com

Nuclear power installed capacity of CPI reaches nearly seven million kilowatts

On August 7, China Power Investment (CPI) issued a press release, saying that CPI, as the only enterprise who has the controlling NPP construction qualification among five major power groups to development the nuclear power has become an important component of the CPI clean energy strategy. Currently, CPI's proportionally controlled operation of nuclear power installed capacity is 1.12 million kilowatts; the controlled proportional holding of the NPPs under construction is 5.86 million kilowatts; shared holding of those in operation is 1.08 million kilowatts and shared holding of the ones under construction is 1.03 million kilowatts.

According to the plan, by 2020, CPI's operational nuclear installed capacitywill reach 14 million kilowatts and close to 10 million kilowatts under construction. At present, CPI has not only invested to constructing Hongyanhe NPP with CGN through proportional holding, but also controlling the constructed Haiyang NPP project in Shandong province.

By 2012, the total installed capacity of CPI has reached 80 million kilowatts, of which the proportion of clean energy accounts for 31.04%. According to CPI's strategic planning, clean energy will reach 40% by 2015 and 50% by 2020.

CPI is one of five state-owned power groups, the wholly owned listed companies held by CPI include China Power (02380.HK), CPI Yuanda(600292.SH), Shanghai Electric Power (600021.SH), Jilin Power Share (000875.SZ), Zhangze Power (000767.SZ) and Loutian Coal.

Source: http://www.china-nea.cn

"Million-kilowatt NPP full-scope simulator" developed by CGN gains special supporting funds

After rigorous evaluation by experts, the achievement transformation project of "million-kilowatt nuclear power plant full-scope simulator" stood out from numerous projects across Beijing, according to China General Nuclear Power (CGN). It has won special supporting funds by its transformation of high-tech achievements in Beijing, 2013.

The aim of the special funds for the transformation of high-tech achievements is to further intensify efforts to support the development of high-tech industry, to promote high-tech achievement transformation in Beijing and to drive the strategic development of emerging industries, established by Beijing Municipal Science and Technology Commission.

CGN Simulation Company's self-developed "million-kilowatt nuclear power plant full-scope simulator" won the 2011 "National Energy Technology Progress Award" and the 2012 "National Key New Product" certificates. Currently, the results have been successfully applied in Ningde NPP, Yangjiang NPP, Fangchenggang NPP, nuclear and simulator projects of Nuclear and Radiation Safety Center.

Source: http://www.cgnpc.com.cn

Special gate manufactured by Shenzhen Longdian has been applied to an NPP

The special gate manufactured by Shenzhen LongdianSci-tech Industrial Co., Ltd used for nuclear power has been successfully applied to Changjiang NPP's construction in Hainan province.

At present, China's requirements for the special gate mainly concentrate on three major aspects - airtightness, fire-resistance and seismic performance. The Longdian special gate has adopted a design with extra large heavy hinges and a rack and pinion latching mechanism, which can meet the sealing requirements under a peak temperature of 225 °C.

Source: http://news.bjx.com.cn

SUFA AP1000 simulating parts of burst valve pass whole performance tests

On August 13, CNNC Sufa Technology Industry Co., Ltd. (SUFA) carried out the machine performance tests of the AP1000 simulating parts of the burst valve and SUFA has applied to renew its applied certificate from NNSA. The trial is key to obtaining an NNSA AP1000 burst valve manufacturing license.

This test has obtained the expected results as the valve opens successfully. In addition, Nuclear Power Institute of China also conducted the valve operation load tests to evaluate the impact of valve action to the pipeline. The test results meet the design requirements so SUFA will obtain this manufacturing license.

Experts from NNSA witnessed the whole test process and relevant experts from Shanghai Nuclear Engineering Research and Design Institute and State Nuclear Power Engineering Co., Ltd also presented the activity.

Source: http://www.cnnc.com.cn

First nuclear safety steel made by a Chinese company

Recently, Zhejiang Zhongda Special Steel Co., Ltd successfully produced Class 2 and Class 3 nuclear safety steel, which is its first nuclear product after it received its nuclear production license this year. This kind of steel is an important material for nuclear instrument piping. The success lays the foundation for localization of nuclear instrument piping, which Zhongda is working towards.

Source:http://www.cnnc.com.cn

Three Products of Far East Were Identified by CEC

On August 3, 2013, China Electricity Council in Beijing organized and held a technology appraisal meeting of "JLHA2X/G1A-1040/75-395 steel-core aluminum alloy stranded wire", "JNRLH1/LBY14 (TACIR/AW)-400/50-54/7 aluminum package

steel core heat-resistant aluminum alloy stranded wire" and "OPGW-24B1-240 [294;276] optical fiber composite overhead ground wire". These new products were researched and developed by the Far East Cable Co., Ltd. and Jiangsu New Far East Cable Co., Ltd. Participating in the appraisal meeting were Wang Chuanbin, Chief Technology Officer of Far East Cable Co., Ltd., Hu Qingping, Senior Director of the Research Management Department, Xu Jing, Deputy Director of the Research and Development Department of overhead wire and related research and development personnel.

The Appraisal Committee was composed of 16 experts from China Electric Power Research Institute, China Power Engineering Consulting Group Corporation, State Grid Corporation of China, Shanghai Electric Cable Research Institute, North China Electric Power Design Institute, East China Electric Power Design Institute, Central Southern China Electric Power Design Institute, Jiangsu Electric Power Company, Guangdong Power Grid Corporation and Zhejiang Electric Power Testing and Research Institute and other organizations.

The Appraisal Committee heard relevant research and development summary reports and examined the identification data. An expert inspection group visited the production site and conducted on-site sampling inspection.

The Committee considered that the "JLHA2X/G1A-1040/75-395 steel-core aluminum alloy stranded wire" product made of zinc-coated steel wire and high strength aluminum alloy (SZ) molded wire has a reasonable structure, smooth and close surface, high strength, and can improve the capacity of power grids to resist disasters and to meet high-capacity and long distance transmission requirements under poor weather conditions. The "JNRLH1/LBY14 (TACIR/AW) -400/50-54/7 aluminum package steel core heat-resistant aluminum alloy stranded wire" product, stranded with aluminum package steel wire and heat-resistant aluminum alloy wire, has a reasonable structure, low sag, good heat resistance and other characteristics. The Appraisal Committee considered the integrated technical performance of the two products have reached the international advanced level, and agreed to adopt the technical appraisal.

After the type testing of the products was completed by the quality inspection and testing center of the electric power industry and power engineering materials parts, China Electric Power Research Institute and Quality Inspection Center of Shanghai Electric Cable Research Institute for Electrical Materials and Special Cable and Wire, the performance indicators were found to be in line with the relevant national standards and enterprise standards.

Source: http://www.fe-cable.com

ABO Valve opens branch in China

ABO, a Czech Republic-based specialist in production of industrial centric & high performance butterfly valves, continues to concentrate on more distant markets in Asia. Following a rapid expansion in sales in the region, ABO has opened its branch in Shanghai, China in August 2013. First branch in the South-East Asia region was established in Singapore in 2010.

ABO supplies both centric as well as high-performance butterfly valves to different water treatment projects as well as oil storage projects in China. Other projects in Asia were in Indonesia, where ABO supplied water-cooling systems for cement units, water treatment plants, and in Vietnam, where ABO supplied products for Floating Production, Storage and Offloading (FPSO) Systems. Many of these projects – especially those in the areas of offshore rigs, tank farms, water treatment and marine industry – were supported by ABO's Singapore branch directly.

"We have managed to grow during the last three years at an average growth rate of 27% annually. Our sales growth is currently driven by high performance valves, which are supplied into complex projects in the area of water treatment, oil and gas

Transportation and storage, and power generation. Our new branch in China, with the support of our established Singapore branch, will cover the promising Chinese market much more efficiently than without direct presence on the market," explains Miro Student, Global Commercial Director of ABO.

Source：http://www.valve-world.net

CNEC signs cooperation agreement with the CAS

On August 15, China Nuclear Engineering Group Corporation (CNEC) and the Chinese Academy of Sciences (CAS) signed a framework agreement on technology cooperation, aiming to build a new platform for scientific and technological exchanges and cooperation.

Wang Shoujun, Party Secretary and General Manager of CNEC, and Zhan Wenlong, Vice-President of CAS, attended the signing ceremony.

This framework agreement involves nuclear technology, nuclear research base and infrastructure construction, advanced nuclearreactor technology research and development,

military engineering technology research and application, and a number of key technology areas.

At the signing ceremony, HeJian, General Manager of Nuclear Construction Clean Energy Co., Ltd. and Xiao Guoqing, Director of the Chinese Academy of the Institute of Modern Physics carried out the cooperation agreement on the industrialization of scientific research.

Source: http://news.bjx.com.cn

International Cooperation

Ding Jian meets with foreign guests from Atomic Energy of Canada

On August 7, the president of Beijing Institute of Nuclear Engineering, Ding Jian together with the general manager's assistant met Mike Soulard from Atomic Energy of Canada (AECL) who is in charge of project CANDU 6 (EC6). The company visitors were also accompanied by the nuclear safety specialist of AECL, NieChunlei.

Mr. Ding extended a welcome to the visitors then explained the background to this meeting and the issues which needed discussion. He briefly introduced the company's overall situation, comprehensive capabilities, progress of existing projects as well as the institute situation. Mike Soulard introduced AECL and gave an updateon the CANDU 6 (EC6) project. Both sides have had in-depth discussions on topics of interest and have expressed willingness to further deepen understanding, close ties and enhance cooperation.

Source: //www.cnpe.cc

All the tube in China

A recent Chinese nuclear-grade import certification (HAF 604) allows Sandvik Materials Technology to now sell tube and pipe for nuclear applications made at its Sandviken, Sweden factory, alongside the steam generator and fuel cladding tube it has sold for years in China. Recent contracts include alloy 690 steam generator tubing to Taishan 2 EPR project suppliers and alloy 690 steam generator tubing for contractors on AP1000 reactors Sanmen 2 and Xianning.

Global sales and marketing manager for nuclear tube and pipe Mikael Blazquez says, "It is not a sexy name, but if you take out steam generator and fuel tube, it is what is left in a nuclear power

plant that is nuclear-classified tubes to heat exchangers, condensers, hydraulic systems, instrumentation systems, these kinds of applications." (There is no difference between tube and pipe, except that pipe is bigger. Sandvik supplies product from 6mm-260mm in diameter, with wall thicknesses down to 0.1 mm).

Not that this is small potatoes, exactly; Blazquez estimates up to 1000 tons of pipe and tube per new reactor. There are 28 such reactors under construction in China, and another 17 to start construction in the next few years to meet targets of 58 GW installed nuclear generation capacity by 2020, according to market research firm UxC.

As an established supplier of highly-engineered tube and pipe, Sandvik's approach to the fabricators that buy tube to supply the Chinese nuclear new-build market is simple: quality. "We as a company focus on the most stringent specifications. There is a lot of tube and pipe in nuclear power plants, but not all of it is nuclear-classified," Blazquez says, adding: "We focus on areas close to the reactor core, with higher safety classes and tougher requirements. That limits the volumes we are aiming for."

Other suppliers of nuclear tube and pipe include ValinoxNucléaire of France, which also markets products in China, Plymouth Tube Co of the USA and Sumitomo Metal Industries of Japan.

Blazquez says that the Chinese nuclear market is not as price-sensitive as people might think. "Chinese authorities take safety very seriously; they were the first country in the world to take strong action after Fukushima to put projects on hold and to do safety reviews, and they did it very quickly. They are very eager to have good quality. When we have discussions with the customer, price is important, but it never wins out over quality."

Having made the product to spec, the logistics of its delivery is the second crucial factor to the Chinese new-build supplier, Blazquez says. Delivery position is more important than lead time. The product must be there when the construction crew is ready for it. "If you say you will deliver, you must deliver on time."

Sandvik supplies tube and pipe to fabricators that use them to create NPP components and sub-assemblies. Since pipes,

as Blazquez puts it, need to be attached to something with something, Sandvik can also provide welding consumables and works with qualified partners to supply complementary products such as fittings or flanges as part of a package.

Otherwise, he says, there is not much product development within existing designs, because the industry is so conservative; innovation generally only occurs at the time of development of a new nuclear power plant design, and the rest of the time suppliers must stick closely to the specification required by customers.

Achieving the required quality is no mean feat. "We have to meet our specifications in every batch, with every tube, every time. There are very tough requirements on material properties, dimensional tolerances or surfaces, and even in their handling; they [the tubes] have to be treated in a certain specific way, through the whole production process."

He says that the company's quality control processes start from the melt stage (material contents analysis) through each stage of production, including extrusion, pilgering (rolling under pressure), annealing, straightening, pickling, and inspection, testing and marking. Along the way, workers

compile a 'history book' dossier full of stamps and test reports. "It is all about tracking, and building trust, but you need evidence to have trust," Blazquez says, adding: "Documentation is part of the delivery. We sometimes say that for every kilogram of tube we make, we produce 10kg of documentation."

Joking aside, demands for quality assessment continue to increase: "There are new protocols added on, but old ones are seldom taken out. For example, we do hydro testing in some cases. However, that is not really needed when we do ultrasonic testing, because whatever we find in UT will cover up what we find in hydro testing. But it is still in the specification because it has always been, and nobody is willing to take it out."

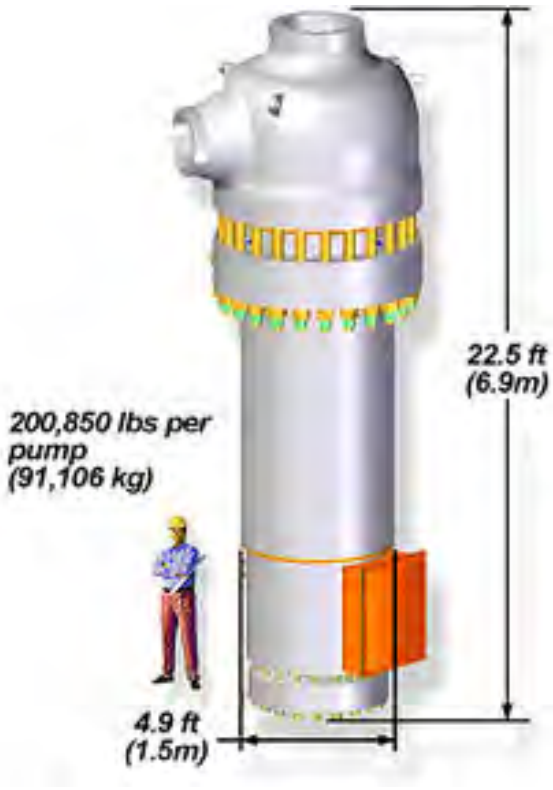
To help maintain quality standards, Sandvik operates an internal accreditation system that involves extra audits and staff training. Only five of its 13 steel mills around the world produce products for the nuclear industry: (Pennsylvania, USA), (Ontario, Canada), Précitube (Charost, France) and Chomutov, Czech Republic. (The Scranton and Arnprior sites are currently in the process of applying for HAF 604 qualification as well).

Sandvik Materials Technology has set up a new factory in Zhengjiang, China, that is currently producing seamless stainless steel tubes for non-nuclear instrumentation and heat exchangers. When asked whether the company would consider setting up nuclear manufacturing there, Blazquez replies, "absolutely," but does not say when; first, the factory needs to build up sufficient nuclear experience. He says that using a factory in China is something that the company is aiming for: "Having local production will definitely strengthen our position in the Chinese nuclear market."

Source: http://www.neimagazine.com

AP1000 pumps China-bound again

The first two main coolant pumps for the Sanmen AP1000 plant are on their way back to China after repair work and re-testing, China's State Nuclear Power Technology Corp (SNPTC) has announced.



Each AP1000 requires four main pumps

(Image: Curtiss-Wright)

Each AP1000 employs four main reactor coolant pumps, which circulate reactor coolant through the core, loop piping and steam generators. The pumps were manufactured by Curtiss-Wright and initially passed qualification testing in June 2012 at Curtiss-Wright Flow Control business segment's Electro-Mechanical Division (CW-EMD) facility in Cheswick, Pennsylvania. However, final testing of a similar pump in January 2013 revealed potential quality problems.

As a result of the problems, SNPTC decided to ship three of the four main pumps it had already received from CW-EMD back to

the USA for replacement of components including the impeller and guide vanes and factory re-testing. That work has now been completed on the first two main pumps. SNPTC expects the re-shipped components to reach Shanghai in early October.

Westinghouse is currently constructing four AP1000 units in China, two each at Sanmen in Zhejiang province and Haiyang in Shandong. Curtiss-Wright was awarded a contract by Westinghouse to produce 16 reactor coolant pumps for the units in 2007. Sanmen unit 1 is currently expected to begin generating electricity in 2014; it is not clear what effect - if any - the coolant pump issue will have on the construction schedule. Curtiss-Wright Flow Control filed an event notification with the US Nuclear Regulatory Commission in May 2013, detailing the issues revealed during final testing of the defective pump. According to that filing, a piece of impeller blade was discovered to have separated from the main impeller casting. The physical cause of the failure, the report concluded, was most likely to be a flaw present in both the cast material and weld overlay applied to the impeller blade, and could not be remediated by subsequent weld repairs. CW-EMD expressed concern at a lack of process control in the sand casting process at Wollaston Alloys, the sub-contractor which had manufactured the defective part.

Source：http://www.world-nuclear-news.org

CNPE Held Exchange Meeting with Ceradyne

In August 2013, Dingjian, General Manager Assistant of CNPE and President of CNPE Design Institute, met with Dennis Manning, general manager of Ceradyne Boron Products. Mr. Zhaobo, vice chief engineer of CNPE, and other staff from the management department of the Design Institute, Reactor Engineering Institution and equipment department also attended the meeting.

Mr. Manning presented the application of enriched boron 10 in worldwide NPPs and its development tendency in 3rd generation NPPs, as well as nuclear fuel transportation and storage of boron and aluminum materials. CNPE introduced ACP1000 3rd generation technology in the meeting. Both sides extended the will for further understanding and deeper cooperation.

Source：http://www.cnpe.cc

Azarga to set up a private company in Hong Kong

Privately owned Hong Kong-based Azarga Resources this week continued a dramatic spurt of activity as it increased to over 10% its share in Australia's Anatolia Energy, which hopes to mine the 17.4 million pounds of U3O8 in the Temrezli deposit in central Turkey (NIW Jun.14'13). This comes only two weeks after Azarga, which Anatolia described in its Aug. 16 announcement as "a private uranium and heavy rare earths development company founded by the Hong Kong-based mining executive," purchased a 17.5% stake in Powertech Uranium, and a 60% stake in the US junior's Centennial uranium project in northern Colorado. It's not clear what Molyneux might have planned for this project, but it's not far from the Hansen/Taylor Ranch project — also in Colorado — owned by Black Range Minerals, in which Azarga became a 19.9% investor in January. Azarga also owns an 80% stake in UrAsia in Kyrgyzstan LLC, which in turn owns the Kyzyl Ompul project in Kyrgyzstan.

Souce: http://www.hooyou.com

RPV of Pakistan Chashma Unit 3 passes acceptance in CFHI

On August 7, China First Heavy Industries (CFHI) completed the manufacturing task of Pakistan's Chashma project by manufacturing the reactor pressure vessel for Unit 3. All technical indicators have met the user's requirements, after the joint inspection by China National Nuclear Corporation, Shanghai Nuclear Engineering Research and Design Institute, China Zhongyuan Engineering Co., Ltd. and other users and experts. It plans to ship on the 15th of this month.

At the acceptance ceremony, Wang Yong, Vice-president of China Zhongyuan Engineering Co., Ltd. Shanghai Branch, and head of the inspection issued a certificate of inspection to Nuclear Power and Petrochemical Division. Vice-president of CFHI, Sun Min, President of Nuclear Power and Petrochemical Division, Xu Chongyong, Assistant of the General Manager of China National Nuclear Corporation, Li Xiaoming, Vice-president of Shanghai Nuclear Engineering Design, Xia Zhiding, General Manager of China Zhongyuan Engineering Co., Ltd., Yang Zhaodong and other leaders attended the ceremony and delivered their speeches. The parties said they have accumulated valuable experience for the manufacturing of subsequent items from the success of this project.

Source: http://www.cfhi.com

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NPP News

Main pump motor of Fuqing NPP Unit 1 hoisted into place

On August 2, the main pump motor of Fuqing NPP unit 1 was smoothly hoisted into place in the main pump room as Fuqing NPP takes a key step on the road towards main pump installation and subsequent work. The whole process lasted more than nine hours from lifting and loading the motor to successfully hoisting it into place.

The main pump motor used in Fuqing NPP units 1-4 was designed and manufactured by Harbin Electric Power Equipment Co., Ltd. It is China's first localized main pump motor.

Source: http: //www.china-nea.cn

Hydraulic components of first main pump of Fangjiashan Unit 1 are installed

On August 2nd, the hydraulic components of Fangjiashan NPP unit 1 were smoothly put in place, marking the official launch of site installation work of the main pump of Fangjiashan NPP unit 1. It lays a solid foundation for the subsequent cold test.

The main pump hydraulic components and electrical parts are arriving at the scene in the form of components. The entire main pump installation is completed through on-site assembly and split installation. The on-site installation of the first main pump's hydraulic components is performed in the second loop of unit one. After the installation and inspection work of the AC plant, then the components are transported to the 1st reactor building for hoisting and other work.

On August 3, once the hydraulic components were installed, the cover of the first main pump was also successfully hoisted into place. At present, the subsequent installation work on site is being carried out in order.

Source: http://www.cnnc.com.cn

Hongyanhe NPP Unit 1 becomes operational with high localization rate

The first nuclear power plant in northeast China—Hongyanhe NPP unit 1 in Liaoning province—has had its first phase put into commercial operation with power generation capacity of 24 million kWh per day, which can meet 1/4 of Dalian's electricity demand. The localization rate of Hongyanhe unit 1 reaches as high as 75%, further enhancing the manufacturing capacity of China's nuclear power equipment.

Hongyanhe NPP was jointly invested and constructed by CGN, China Power Investment Corporation and Dalian Construction Investment Group Co., according to equity ratio of 45%: 45%: 10%. It adopts the improved pressurized water reactor technology CPR1000 which was designed by CGN. The reactor pressure vessel of Hongyanhe unit 1, manufactured by China First Heavy Industry Group, is the first million-kilowatt nuclear reactor pressure vessel in China with wholly owned intellectual property rights.

Source: http://www.nea.gov.cn

First reactor vessel installed at Changjiang NPP

The reactor pressure vessel has been installed at unit 1 of the Changjiang nuclear power plant in China. The CNP-600 unit is set to start operating by the end of next year.

Plant constructor China Nuclear Engineering and Construction Corporation reported that the vessel was placed within the unit's reactor building on 10 August. The component - weighing some 250 tonnes and measuring about ten meters long - was manufactured by Shanghai Electric Nuclear Power Equipment Co Ltd under a contract signed in December 2008. It arrived on the construction site on 5 August after being transported by ship from Shanghai.

Initial approval for the Changjiang plant's construction was granted by China's National Developmental and Reform Commission in July 2008. Early site works began in December 2008. Construction of unit 1 began with the pouring of first concrete on 25 April 2010, while that for unit 2 was poured on 21 November 2010. Changjiang 1 - whose containment building dome was installed in December 2011 - is scheduled to begin operating by the end of 2014, with unit 2 set to start up the following year.

The Changjiang plant, near Hoi Mei Tong village on China's southern island province of Hainan, is being built as a joint venture between China National Nuclear Corporation (CNNC) and China Huaneng Group, with shares split 51% and 49%, respectively. The plant will eventually comprise four 650 MWe CNP-600 pressurized water reactors.

Source：http://www.world-nuclear-news.org

The vessel is carefully lowered into place Source：CNNC

Ningde NPP Unit 2 completes reactor installation before hot test

On August 10, the nuclear power reactor company EM2 team (which belongs to China Nuclear Industry 23 Construction Co., Ltd.) successfully completed tensile work of 58 main bolts of Ningde NPP Unit 2. Since then, all installed work has been completed successfully in anticipation of the hot test.

This is one of the riskiest parts of the construction and most difficult among the preparation work of Ningde NPP unit two. Because of the bulk of the overall bolt tension machine and complex equipment structure, coupled with 58 main bolts installed on the overall machine, the highest lifting standard and stretching precision are required for the whole work. To ensure that the lifting of the overall bolt tension machine and the tensile work of the main bolts would be smoothly completed, Ningde EM2 team spent 9 days in completing the final stretch since August 2 when the reactor components were smoothly transferred to the pressure vessel. Throughout the construction process, the quality, safety and progress have been effectively controlled; the construction preparation has been planned properly and all types of crafts and working procedures have been closely linked.

Source: http://news.bjx.com.cn

Shandong Province will restructure its energy

Shandong government recently launched “2013—2020 Atmospheric Contamination Rules”, in which it defines that imported electricity in Shandong province will account for 30% by 2020. Shandong government is actively restructuring its energy mix and taking control over coal energy. It is setting a goal to reduce the proportion of coal to 60% of total energy. Shandong government will “import” more electricity from other provinces, such as Shanxi province. Imported electricity will reach 16 GW by 2015 and 32 GW by 2020, which will account 30% of total electricity.

Shandong will also pay more attention to the development of nuclear safety. Haiyang phase 1 unit 2 and Rongcheng Shidaowan HTR will start operation by 2020. It will speed up the construction of Haiyang phase 2, as well as the CAP1400 advanced PWR in the Rongcheng Shidaowan project. Shandong government will propel preliminary work of 2 AP1000 units of Shidaowan, and start the site selection for the third NPP. By 2020, its total installed capacity will reach 270 GW.

By the end of 2017, small thermal power will be weed out, this will be equivalent to 5 GW of installed capacity. 3.6 million tons of green steel and 3.5 million tons of pudding from Laigang Group will be eliminated.

Source：http://news.bjx.com.cn

Two achievements of Ningde NPP have been awarded a new patent certificate

The “long rod platinum resistance calibration device” and “containment leak rate analysis system” which were designed and developed by Ningde nuclear power plant have achieved new patent certificates, which have been reviewed by the State Intellectual Property Office.

Ningde NPP has been actively promoting technological innovation and application of new technologies in recent years though solving NPP problems and carrying out technical research focus on key projects. These two achievements have a positive effect on technological innovation and the subsequent application for high-tech enterprises.

Source:http://www.cgnpc.com.cn

First main pump motor for Fangjiashan Unit 1 is hoisted in place

On August 17, the first main pump motor of Fangjiashan NPP Unit 1 was successfully hoisted onto the pump bearing, marking that Fangjiashan NPP has taken a key step towards site installation of the main pump and has laid a solid foundation for the subsequent cold test.

Through cooperation between Harbin Electric Group and Andritz Group of Austria, the Fangjiashan main pump motor introduces cutting-edge technology, absorption and has ultimately achieved localization. The on-site installation of the first main pump motor is the second loop of Unit 1. After completing the assembly and inspection of the AC plant, the motor was transported to the 1st reactor building for lifting. The site installation work on the main pump has been performed in a comprehensive and orderly manner.

Source: http://news.bjx.com.cn

Hot tests begin at Chinese unit

Pre-operational testing has started at unit 2 of the Ningde nuclear power plant in China's Fujian province. The CPR-1000 pressurized water reactor is expected to begin operation next year.

The hot tests aim to simulate the temperatures and pressures which the reactor's systems will be subjected to during normal operation. This important phase ensures coolant circuits and nuclear safety systems are functioning properly before fuel can be loaded.

The tests began at Ningde 2 on 16 August and are expected to take about 45 days to complete. The unit is scheduled to start commercial operation in the second half of 2014.

It is one of four CPR-1000 units being built on the site. Construction of units 1 and 2 started in 2008 and units 3 and 4 started in 2010. Unit 1 began operating in April 2013. All four units will be in operation by 2015.

The Ningde plant is 46% owned by China General Nuclear (CGN) and 44% by China Datang Corporation. The remaining 10% is held by Fujian Provincial Energy Group. Two further CPR-1000 units are planned at the site.

Source: http://www.world-nuclear-news.org

Over 7,000 tons of seismic reinforcement is provided for Yangjiang NPP

On August 10, 1,700 tons of HRB400EΦ32mm seismic reinforcement was delivered directly toYangjiang NPP by Hbei Iron and Steel Group. This was the fourth delivery this year making a total of more than 7,000 tons so far.

Hebei Iron and Steel Group has attached great importance to supplying Yangjiang NPP, from blank smelting to billet rolling, organizing relevant technical personnel for tracking and the dragnet inspection on all aspects that affect product quality. The group has strictly implemented the process points and “regulations on management and control of reinforcement production used for nuclear power”.

Yangjiang NPP is located in the western coastal Yangjiang City, Guangdong province, and is one of the national key nuclear power projects. There is a total of 6 million-kilowatt nuclear power plants under construction, for completion in 2017.

Source: http://news.bjx.com.cn

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本月专访

加拿大坎杜能源公司市场及业务发展高级副总裁 Ala Alizadeh 先生专访

加拿大坎杜能源公司 市场及业务发展高级副总裁 Ala Alizadeh 先生专访

电话：1-866-962-2638 邮箱：spmbd@candu.com

DPS：请介绍一下您的个人背景。您是何时加入坎杜能源公司的？您在该公司负责哪块业务？

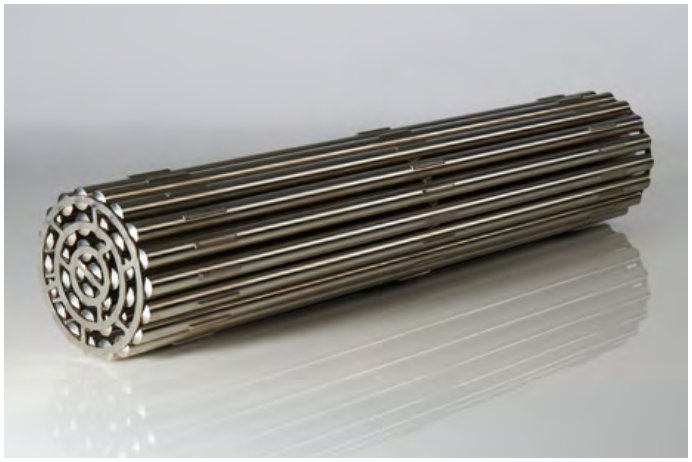
Ala Alizadeh: 我是坎杜能源公司副总裁，负责市场及业务发展。我在核电领域已经有 30 多年的工作经验，我还参与了加拿大及全球 CANDU 反应堆的设计和建造。我于 2011 年加入坎杜能源公司，之前我在加拿大原子能有限公司工作了大概 30 年。

DPS: 您为何选择加入坎杜能源？

Ala Alizadeh: CANDU 反应堆技术具有经济、高效和环境友好等优势，我加入该公司是为了继续在加拿大和全球推广这种先进技术。

DPS: 坎杜能源都提供哪些服务？

Ala Alizadeh: CANDU 反应堆生产的电力满足安大略省 50% 的电力供应，同时 CANDU 反应堆满足了加拿大全国 16% 的电力需求。该反应堆项目分布全球四个洲，是清洁空气能源项目的重要组成部分，装机总量高达 22,000 兆瓦。坎杜能源的产品安全可靠、性价比高，并且十分关注未来发展，以生产无 CO2 的能源作为目标，同时坎杜能源的产品满足全球核能行业的最高安全标准和规定。



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DPS：你们还为压水堆（PWRs）和沸水堆（BWRs）等其它能源领域供应优质产品和服务，可否介绍一下这些产品和服务？针对以上项目，哪些国家是你们的出口对象？

Ala Alizadeh: 坎杜能源的产品和服务范围涵盖 CANDU 反应堆项目和非 CANDU 反应堆项目，且我们的业务在不断扩大。阿根廷、比利时、加拿大、法国、美国的反应堆都安装了我们的应急冷却过滤器。我们的非能动自动催化复合剂可以阻止氢气的增加，该产品出口加拿大、芬兰、法国、韩国和乌克兰。我们的特种泵密封在业界具有高可靠性和耐用性，被安装在 CANDU 反应堆和非 CANDU 反应堆中。

DPS: 坎杜能源公司于 2011 年成立后，接管了 AECL（加拿大原子能有限公司）的商务反应堆部门。您能否介绍一下坎杜能源与 AECL 之间的合作关系？

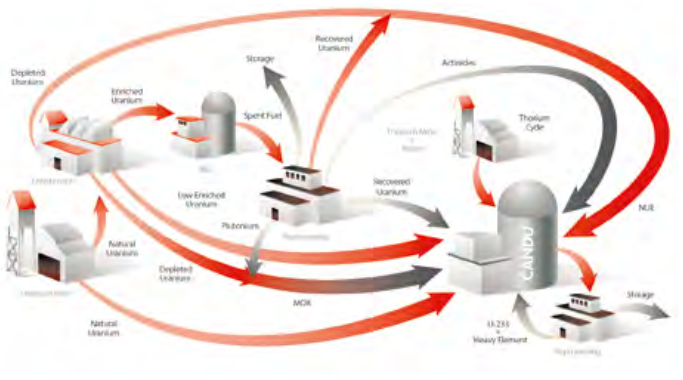
Ala Alizadeh: 我们和 AECL 建立了非常密切的合作关系。AECL 是加拿大的国家实验室，为核能研究和发展做出了积极的贡献和支持。坎杜能源的客户可以应用 AECL 的专业测试设施来支持其 CANDU 项目，如 NRU 反应堆和 ZED-2 反应堆。

DPS: 谁来负责中国秦山 3 期的 CANDU 项目的维修和翻新工作，坎杜能源还是 AECL？

Ala Alizadeh: 坎杜能源与中国客户保持紧密的联系，以确保中国 CANDU 反应堆持续生产安全、可靠、竞价比高的无 CO2 的能源。

DPS: 坎杜能源在核电项目中是否有自主决定权？还是你们需要依赖兰万灵集团？

Ala Alizadeh: 虽然坎杜能源是兰万灵集团的分公司（我们向集团的能源部做汇报），但是我们有自己的决策层和独立的董事会。



DPS: 贵公司是否定期为你们的工程师做培训?

Ala Alizadeh: 坎杜能源每年分配一定的预算对我们的工程师和雇员进行培训。另外，我们鼓励员工撰写论文并在工业大会上进行分享，这样员工可以提高他们的专业技能。

DPS: 你们在中国上海设立了代表处（坎杜能源上海代表处），它对坎杜公司在中国的市场推广起到什么作用?

Ala Alizadeh: 我们一贯秉承与客户保持密切的联系。而在上海设立办事处能够确保我们更好的为我们的中国客户和合作伙伴提供服务。

DPS: 日本福岛事故是否对 CANDU 反应堆造成了影响? 该事故发生后，贵公司是否接到了政府或客户提出的新要求?

Ala Alizadeh: 日本福岛事故发生后，核能行业针对日本事故进行了多次独立调研，并对核电站的安全性能进行了重新评估。坎杜能源不仅也进行了调研工作，而且对加拿大已在运行的 CANDU 项目的调研工作给予积极的支持。从国际层面来讲，我们积极参与全球与福岛事故相关的论坛和会议，从不同角度了解福岛核电站的经验教训。论坛和会议的组织者包括世界核能协会（WNA），国际原子能组织（IAEA），欧洲核安全监管组织等。

通过参与这些活动，我们更加确定了 CANDU 反应堆的设计具备非常高的安全性能。

当然我们也谨记福岛事故的经验教训，并对我们的新型产品加强型 CANDU6 反应堆的设计做出了进一步的安全性能改进。

福岛事故发生后，不仅加拿大监管部门对反应堆进行了检查，欧洲监管部门也对罗马尼亚的两个 CANDU 6 机组（Cernavoda 1 号和 2 号机组）进行了检测，该检测属于欧盟核电站压力测试的一部分。

DPS: 加拿大核安全委员会已经对坎杜能源的 EC6 做出了第三次和最后一次评审。可否介绍一下 EC6 的特征?

Ala Alizadeh: 我们有 11 个 CANDU 6 反应堆在全球五个国家的核电站中运行，根据这些反应堆的研发、设计、建造和运行经验及客户反馈，我们研发除了加强型 CANDU 6 三代反应堆技术。该技术在保留了 CANDU 6 的基本功能之外，还具备了其它创新功能和先进技术，进一步提高了安全性能。以下列举了部分功能：

- 即时装料（天然铀燃料）
- 92% 以要素上能够实现预计年度运行目标
- 配备现代化的汽轮机设计方案，大大提高了运行效率和产能
- 配备先进的控制室，提高了核电站运行能力和维护能力
- 卓越的安全性能和经济效益

控制室

- 高度的本土化定位
- 适合中小型电网

EC6 是一个 700 兆瓦的重水慢化和重水冷却反应堆。重水是水的自然形态，在反应堆中用作慢化剂来减慢中子的裂变连锁反应。重水是最有效的慢化剂之一，通过运用重水 CANDU 反应堆可以直接采用天然铀作为燃料，这也是 CANDU 反应堆的独特之处。直接采用天然铀作为燃料可以提高一个国家的能源独立能力，因为这种燃料无需经过加工，可以直接生产。

DPS:EC6 现在并入坎杜能源 ACR1000。而 ACR1000 在 2011 年 1 月份就通过了加拿大核安全委员会发照前的审查。您能否介绍一下 ACR1000？

Ala Alizadeh: 坎杜能源先进型 CANDU 反应堆（ACR-1000®）是 1200 兆瓦的三代加重水堆，安全可靠、环境友好、经济实惠。ACR-1000 发展计划已经成形，将会与有意向的机构或公司开展合作商讨，或者针对项目进行投标。

DPS: 贵公司是否计划向中国出口 EC6 反应堆?

Ala Alizadeh: 我们现在正在就先进燃料 CANDU 反应堆（AFCR）的全面应用与中国合作伙伴展进行协商。AFCR 是在加强型 CANDU 6 的基础上研发出来的，是 700 兆瓦的三代技术。该反应堆可以采用的燃料有回收铀（RU），天然铀等同物，回收铀的衍生物（DRU）和钍。

DPS: 你们是否与中国核电公司建立了合作关系?

Ala Alizadeh: 是的，坎杜能源与许多中国核电公司建立了合作关系，如秦山第三核电有限公司、中核北方燃料元件有限公司、中国核动力研究院等。

DPS:2013 年 4 月，Guselle 先生和 Alizadeh 博士来到中国与中国合作伙伴商讨共同开发先进型燃料 CANDU 反应堆事宜，该反应堆采用回收铀和钍作为替代燃料。您能够给我们介绍一下这个项目?

Ala Alizadeh: 地球上钍的储存量是铀的 3 到 4 倍，且具备开发价值。对于像中国这样钍储存丰富，铀匮乏的国家而言，以钍作为燃料的 CANDU 核电站具有一定的吸引力，该反应堆技术可以帮助中国实现能源独立。

为了进一步研发这种采用循环铀和钍作为替代燃料的反应堆技术，2012 年坎杜能源与中核集团下属公司—秦山第三核电有限公司、中核北方燃料元件有限公司、中国核动力研究院签订了合作协议书。2012 年我们在秦山核电站成功的展示了回收铀在 CANDU 反应堆上的应用，现在我们正与合作伙伴共同合作，致力于到 2014 年将反应堆机组转化为能够采用回收铀和贫化铀。

6 月下旬，坎杜能源为秦山第三核电有限公司提供一套完整、详尽的技术文件，以支持该公司向中国核电监管部门申请首个实心天然铀相等物（NUE）的燃料许可执照。有了这套技术文档的支持，秦山第三核电有限公司将会向国家核安全局提交申请，在现在运行的 CANDU 反应堆中采用 NUE 燃料替换目前在用的天然铀燃料。

DPS: 中国有很多反应堆技术，而且 AP1000 和 CAP1400 技术目前非常受欢迎。您如何看待 CANDU 技术技术在中国的发展?

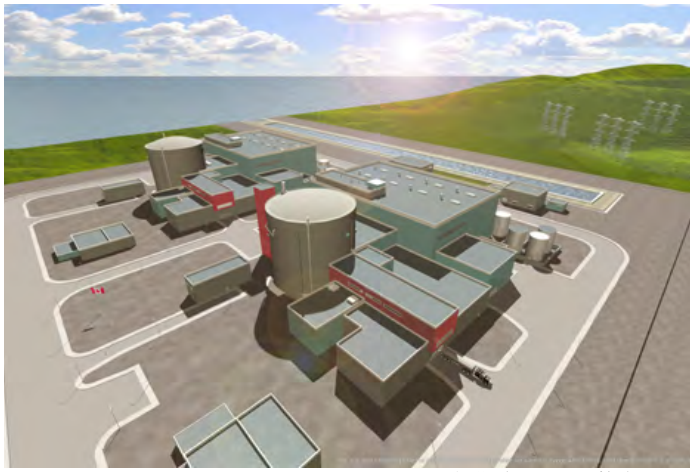
Ala Alizadeh: 过去的 20 年我们向全球设计、建造、供应了 6 台反应堆，所有项目都在预算内按时、甚至提前交付。这在核电领域很少有供应商可以做到。我们的 AFCR 反应堆可以采用先进型燃料，这巩固了我们在中国核电市场的地位。轻水堆制造的乏燃料可以在 CANDU 反应堆内实现再利用，而这种协同关系将会很快得以开展。

DPS: 坎杜能源将会通过中国走向其它亚洲国家吗?

Ala Alizadeh: 是的，我们与中国合作伙伴不仅非常看重中国项目，而且也在寻求其它国家的项目。现在我们正在与马来西亚核电公司商讨他们国家的项目合作机会。

DPS: 全球有 34 个反应堆是由坎杜能源提供的，那么你们接下来将开展什么新项目?

Ala Alizadeh: 我们的反应堆分布在全球四大洲，为本地居民提供安全可靠、性价比高的无 CO2 能源，产能高达 22,000 兆瓦，对此我们感到十分自豪。同时，我们也在寻求加拿大、中国、罗马尼亚、阿根廷、英国等其它国家的项目合作机会。我们的核电站寿命延长专家正在阿根廷一线工作，为恩尔巴斯的 CANDU 6 反应堆做换管的准备工作。这将会为该核电站延长 30 年的寿命，确保电站安全高效运行。一直以来，我们与加拿大及全球客户共同开展核电站生命周期管理和电站维持项目。



先进型 CANDU 6 核电站

民用核安全设备无损检验人员资格管理规定

（HAF501）

民用核安全设备无损检验人员资格管理规定（HAF501）

第一章　总　则

第一条　为保证核材料的安全与合法利用，防止被盗、破坏、丢失、非法转让和非法使用，保护国家和人民群众的安全，促进核能事业的发展，制定本条例。

第二条　本条例管制的核材料是：

（一）铀－235，含铀－－235 的材料和制品；

（二）铀－233，含铀－－233 的材料和制品；

（三）钚－239，含钚－－239 的材料和制品

（四）氚，含氚的材料和制品；

（五）锂－6，含锂－－6 的材料和制品；

（六）其他需要管制的核材料。铀矿石及其初级产品，不属于本条例管制范围。已移交给军队的核制品的管制办法由国防部门制定。

第三条　国家对核材料实行许可证制度。

第四条　核材料管制的基本要求是：

（一）保证符合国家利益及法律的规定；

（二）保证国家和人民群众的安全；

（三）保证国家对核材料的控制，在必要时国家可以征收所有核材料

第五条　一切持有、使用、生产、储存、运输和处置第二条所列核材料的部门和单位必须遵守本条例。

第二章　监督管理职责

第六条　国家核安全局负责民用核材料的安全监督，在核材料管制方面的主要职责是：

（一）拟订核材料管制法规；

（二）监督民用核材料管制法规的实施；

（三）核准核材料许可证。

第七条　核工业部负责管理全国的核材料，在核材料管制方面的主要职是：

（一）负责实施全国核材料管制；

（二）负责审查、颁发核材料许可证；

（三）拟订核材料管制规章制度；

（四）负责全国核材料帐务系统的建立和检查。

第八条　国防科学技术工业委员会负责涉及国防的核材料的安全监督和核准核材料许可证。

第三章　核材料管制办法

第九条　持有核材料数量达到下列限额的单位必须申请核材料许可证；

（一）累计的调入量或生产量大于或等于 0.01 有效公斤的铀、含铀材料和制品（以铀的有效公斤量计）；

（二）任何量的钚－－239、含钚－－239 的材料和制品；

（三）累计的调入量或生产量大于或等于 3.7 ×10 的 13 次方贝可（1000 永）的氚、含氚材料和制品（以氚量计）；

（四）累计的调入量或生产量大于或等于 1 公斤的浓缩锂、含浓缩锂材料和制品（以锂－6 量计）。累计调人或生产核材料数量小于上列限额者，可免予办理许可证，但必须向核工业部办理核材料登记手续。对不致危害国家和人民群众安全的少量的核材料制品可免予登记，其品种和数量限额由核工业部规定。

第十条　核材料许可证的申请程序是：

（一）核材料许可证的申请单位向核工业部提交许可证申请书以及申请单位的上级领导部门的审核批准文件；

（二）核工业部审查并报国家核安全局或国防科学技术工业委员会核准

（三）核工业部颁发核材料许可证。

第十一条　核材料许可证持有单位必须建立专职机构或指定专人负责保管核材料，严格交接手续，建立帐目与报告制度，保证帐物相符。

许可证持有单位必须建立核材料衡算制度和分析测量系统，应用批准的分析测量方法和标准，达到规定的衡算误差要求，保持核材料收支平衡。

第十二条　许可证持有单位应当在当地公安部门的指导下，对生产、使用、贮存和处置核材料的场所，建立严格的安全保卫制度，采用可靠的安全防范措施，严防盗窃破坏，火灾等事故的发生。

第十三条　运输核材料必须遵守国家的有关规定，核材料托运单位负责与有关部门制定运输保卫方案，落实保卫措施。运输部门、公安部门和其他有关部门要密切配合，确保核材料运输途中安全。

第十四条　核材料持有单位必须切实做好核材料及其有关文件、资料的安全保密工作。凡涉及国家秘密的文件、资料，要按照国家保密规定，准确划定密级，制定严格的保密制度，防止失密、泄密和窃密。

对接触核材料及其秘密的人员，应当按照国家有关规定进行审查。

第十五条　发明核材料被盗、破坏、丢失、非法转让和非法使用的事件，当事单位必须立即追查原因、追回核材料，并迅速报告其上级领导部门、核工业部、国防科学技术工业委员会和国家核安全局。对核材料被盗、破坏、丢失等事件，必须迅速报告当地公安机关。

第四章　许可证持有单位及其上级领导部门的责任

第十六条　核材料许可证持有单位的责任是：

（一）遵守国家的法律和法规；

（二）对所持有的核材料负全面安全责任，直至核材料安全责任合法转移为止；

（三）接受管理和监督。

第十七条　核材料许可证持有单位的上级领导部门应当给所属持有单位以必要的支持和督促检查，并承担领导责任。

第五章　奖励和处罚

第十八条　对核材料管制工作做出显著成绩单位、个人，由国家核安全局、国防科学技术工业委员会或核工业部给予表扬和奖励。

第十九条　凡违反本条例的规定，有下列行为之一的，国家核安全局可依其情节轻重，给予警告、限期改进、罚款和吊销许可证的处罚，但吊销许可证的处罚需经核工业部同意。

（一）未经批准或违章从事核材料生产、使用、贮存和处置的；

（二）不按照规定报告或谎报有关事实和资料的；

（三）拒绝监督检查的；

（四）不按照规定管理，造成事故的。

第二十条　当事人对行政处罚不服的，可在接到处罚通告之日起十五日内向人民法院起诉。但是，对吊销许可证的决定应当立即执行。对处罚决定不履行又不起诉的，由国家核安全局申请人民法院强制执行。

第二十一条　对于不服从核材料管制、违反规章制度，因而发生重大事故，造成严重后果的，或者盗窃、抢劫、破坏本条例管制的核材料，构成犯罪的，由司法机关依法追究刑事责任。

第六章　附则

第二十二条　本条例下列用语的含义：

（一）“浓缩锂”——指锂－6同位素原子百分含量大于天然锂的；

（二）“铀的有效公斤”——指铀（包括加浓铀、天然铀、食化铀）按如下方法计算的有效公斤；

1、对于铀——235同位素原子百分含量不小于1%的铀，以公斤为单位的铀的实际量乘以铀——235同位素原子百分含量的平方。

2、对于铀——235同位素原子百分含量小于1%，大于0.5%的铀，以公斤为单位的铀的实际重量乘以0.0001。

3、对于铀——35同位素原子百分含量不大于0.5%的铀，以公斤为单位的铀的实际重量乘以0.00005。

4、对于铀——233，其有效公斤算方法与铀——235相同。

第二十三条　本条例由国家核安全局负责解释；本条例的实施细则由国家核安全局会同国防科学技术工业委员会、核工业部制定。

第二十四条　本条例自发布之日起施行。

第五届中国核电前沿高峰论坛2013

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——优化核电装备制造业产业链，推动第三代核电设备国产化进程

会议亮点

1. 了解中国核电新建项目的最新动态
2. 深入解析中国核电技术路线未来发展方向
3. 剖析三代核电技术对核电装备制造业的影响
4. 知悉中国三代核电设备国产化的最新进展
5. 解析核安全设备监管体系及存在问题
6. 掌握中国核电自主标准体系建设的最新动态，提升核电装备制造效率
7. 探寻中国核电装备制造企业走向国际核电市场的成功之路
8. 泵阀，暖通分会场，详细解析三代核电技术对泵阀，暖通设备的影响
9. 一对一的高效客户项目洽谈机会

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会议展会

9 月

2013 中国国际核电装备展览会

时间：2013/09/02-2013/09/04

地址：中国国际展览中心

联系人：李仕友

联系方式：13801178558

网址：http://www.cine010.com.cn/Index/

2013 中国国际电力设备与智能电网展览会

时间：2013/09/02-2013/09/04

地址：中国国际展览中心

联系人：李仕友

联系方式：13801178558

网址：http://www.epchina010.com//Index/

2013 第八届山东国际工业装备展览会

时间：2013/09/02-2013/09/04

地址：济南国际展览中心

联系人：刘慧贞

联系方式：18963097168

网址：http://www.gyz-xz.com/

第十届中国－东盟博览会核电工业展

时间：2013/09/03-2013/09/06

地址：中国．南宁国际会展中心

联系人：莫玉娟

联系方式：13517677479

网址：http://www.caexpo.org/

第四界苏州国际数控机床及金属加工工业展览会

时间：2013/09/23-2013/09/25

地址：苏州国际展览中心

联系人：苏州国华展览有限公司

联系方式：86-512-62804023

网址：www.metaltechexpo.com/lxwm.asp

第 14 届中国国际机电产品博览会

时间：2013/09/23-2013/09/26

地址：武汉国际博览中心

联系人：向剑林

联系方式：13207170419

网址：http://www.cwme.com.cn/

中国国际（宁波）自动化仪器仪表及测量控制展览会

时间：2013/09/26-2013/09/28

地址：宁波国际会展中心

联系人：杨振

联系方式：860574-87787583

网址：http://www.aciexpo.com/

http://www.haozhanhui.com/zhanlanjihua/2013_9___c_1.html

10 月

第十届中国（北京）国际冶金工业博览会

时间：2013/10/16-2013/10/18

地址：中国国际展览中心

联系人：刘春丽

联系方式：13651168649

网址：http://www.bcime.com/

第五届中国（无锡）国际新能源大会暨展览会

时间：2013/10/24-2013/10/26

地址：无锡太湖国际博览中心

联系人：何立国

联系方式：18061519949

网址：www.crecexpo.com

第八届上海国际石油石化天然气技术装备展览会

时间：2013/10/28-2013/10/30

地址：上海新国际博览中心（龙阳路 2345 号）

联系人：陈斌

联系方式：18964077791

网址：http://www.sippe.org.cn/index.asp

亚洲国际动力传动与控制技术展览会

时间：2013/10/28-2013/10/31

地址：上海新国际博览中心

联系人：叶晋熔

联系方式：021-5045 6700

网址：http://www.ptc-asia.com/CN/

第十八届中国国际质量控制与测试工业设备展览会

时间：2013/10/30-2013/11/1

地址：上海光大会展中心西馆一层

联系人：王为纲

联系方式：021-65555687

网址：http://www.mat-test.com/openex.asp?id=12

11 月

2013 中国义乌国际装备制造业博览会

时间：2013/11/19-2013/11/22

地址：义乌国际博览中心

联系人：孙挺

联系方式：86-10-58280741

网址：http://www.ywmeexpo.com/www/

扬州 2013 国际机床模具展览会

时间：2013/11/21-2013/11/23

地址：扬州国际博览中心

联系人：杨先生

联系方式：13914008762

网址：http://www.ly-expo.com/

2013 年第五届上海国际锻造（产品）博览会

时间：2013/11/28-2013/11/30

地址：上海国际博览中心

联系人：上海奥亚展览有限公司

联系方式：021-33518138

网址：www.forging-expo.cn

科技文章

中国核电企业走向全球

压制完美的燃料芯块

中国核电企业走向全球

作者：Yun Zhou, Christhian Rengifo, Jonathan Hinze, Ux 咨询有限公司

过去的十年，中国核电行业发展速度十分显著，这从其已建和在建反应堆的数量便能看出，为了满足反应堆数量的快速扩张中国供应链也得到快速的发展。尽管受日本福岛事故的影响，到 2020 年中国的装机总量将会有所下降，但是中国政府仍然将核能源看作是中国混合能源结构中的一大重要因素，并预计在未来几十年中建造更多的反应堆。在国际合作伙伴的支持下，中国在三代反应堆部件本土化制造道路上取得了重大进步。实现了重型部件的本地制造，除此之外还有一些关键设备，如仪控技术等。中国未来将会研发自己的三代技术，并向全球推广。

中国核电得到快速发展，目前其大型核电企业正计划拓展海外核电项目。中国之前已经向巴基斯坦出口了两个自主研发的 CNP-300 反应堆，眼下正计划向巴基斯坦出口。虽然目前为止，中国的反应堆出口仅限于以上提到的案例，但是这也显示出中国已经具备掌控海外核电站的技术能力了。

中国公司对那些有竞争力的项目更感兴趣。不仅是中广核、中核这种核电企业，金融机构也对海外项目表现出浓厚的兴趣。那么中国公司会以什么的形式参与海外核电项目呢？可能是核电部件的供应商、核电服务商、金融投资者或全套 NSSS 系统（核蒸汽供应系统）的供应商。如果是最后一种合作形式，那么中国会像其它国家一样（如南韩）发展成为国际 NSSS 系统供应国。

中国为何希望走向全球？

中国国有核电企业和民营企业正在全球范围内寻求新的资产，进行合并、收购等投资活动。有数字显示过去十年中国海外投资量呈上涨趋势。大多数海外投资来源于中国国有核电企业，原因是这些企业享受来自本国政府的支持，如银行贷款等。中国走向全球的部分原因在于中国希望借助海外资源保证国内自然资源的充足、获得更多不同的技术、增加其政治影响力。而中国强有力的财政地位能够确保这这些投资的有效执行。

根据中国参与的国际项目来看，中国参与海外项目的一个重要推动因素在于其想成为全球核电行业的领头军。几年前，中国政府将核能囊括为中国将大力发展的五大行业中，同时中国计划从基础制造行业向高新技术行业转型。另外一个推动力在于中国希望借助参与海外项目提高其全球经济排名。

中国感兴趣的国际核电站项目

如上所述，中国有意愿参与各种国际核能项目。在某些项目中，中国公司可能会与国际合作伙伴共同参与，但是某些项目中，中国可能更愿意独揽大权。

第一步：巴基斯坦

中国的第一个反应堆出口对象是巴基斯坦，当时向该国出口了两个 235 兆瓦的 CNP-300 反应堆技术，现在这两个反应堆都在恰希玛运行。恰希玛 1 号反应堆的运行时间是 2000 年，2 号反应堆运行时间是 2011 年。该出口是基于中国秦山 1 期项目 1 号反应堆的建造经验。另外，2011 年，巴基斯坦恰希玛反应堆开始建造 3 号和 4 号反应堆，应用的也是 CNP-300 技术。如今，中核计划向巴基斯坦出口一个 1000 兆瓦的反应堆，尽管目前尚不清楚是否是中核的三代反应堆技术—ACP-1000。

寻求新的市场

除了巴基斯坦，中国核电公司还对其它国家的核电项目表现出浓厚的兴趣，如北美、欧洲、南美、中东等。中国已经与至少 16 个国家签订了合作协议，包括阿根廷、比利时、巴西、加拿大、埃及、法国、德国、伊朗、日本、韩国、巴基斯坦、瑞士、越南、英国、美国和阿拉伯。

尽管中国十分关注海外项目，但是目前仅是进行了项目沟通，并未取得实际的结果。近期对于中国而言最有可能的一个项目机会是土耳其计划在其它国家建立一个核电站。当然，中国会逐渐参与到美国、南非、英国、罗马尼亚、阿根廷等国家的核电项目中，不过这个时间周期可能较长。

中国准备好了吗？

中国公司可以以不同的形式参与海外项目。例如，中国公司可以作为投资商，支持项目顺利执行。由于一些国外核电企业向中国进行了技术转移，一些中国核电公司已经具备了生产和制造能力，因此可以向海外项目提供相关服务。另外，中国公司还可能会成为 NSSS 系统的供应商，从而负责整个项目（如巴基斯坦项目）。

财政投入

中国三大核电公司—中核、中广核和国核都对海外项目十分感兴趣。这三家公司在中国都有运行或在建的反应堆。这三家企业在开展海外项目方面可以享受政府的支持，因此财政因素对于它们来说不会造成约束。就如土耳其或阿联酋的项目一样，参与这些项目的公司都享受本国政府的补贴。值得注意的一点，由于现在中国反应堆建设速度放缓，因此中国公司

有财政实力参与海外项目。

制造

二代反应堆技术在中国发展较为成熟，中国核电设备制造业基本上可以完成像反应堆容器、蒸汽发生器、冷却泵、管道等 NSSS 系统的主要设备的供应。以中广核的红沿河 2 期项目为例，该项目 85% 以上的关键设备实现了国产化，整个项目的国产化率不低于 70%。所有 NSSS 系统的关键设备都由本土公司提供，如中国一重、二重、上海电气、沈阳鼓风机集团、东方电气、江苏神通阀门、大连大高阀门、中核苏阀科技等。这些公司为中国核电站供应关键部件的锻造、制造，冷却泵、管道、阀门等。

中国正在实行三代核电技术的本土化战略，并且已经在重要部件和设备上实现了本土化。三门 2 号机组 AP1000 项目的压力容器就是在中国一重制造的。哈尔滨电气公司和上海电气分别负责为三门 2 号机组和海阳 2 号机组提供蒸汽发生器。三门 1 号 2 号机组和海阳 1 号 2 号机组的钢制安全壳由山东核电设备制造有限公司提供。其它 AP1000 部件还处于研发阶段，或是通过国际合作进行共同研发，如堆内构件、控制棒驱动机构、冷却泵等。

总体而言，中国现在有能力研发和生产关键部件和设备。专家相信再过几年，中国将有能力完成关键设备和部件的本土化制造，并实现出口。

NSSS 技术

值得注意的是中国将以韩国为榜样发展核电，并致力于立足国际核电市场。福岛事故发生之前，中国本来计划出口其二代加反应堆技术，但是福岛事故显现出这种技术存在一定的缺陷。因此，中国决定加快研发非能动安全技术。中国对其三代技术寄予厚望，希望借助该技术与国际其它技术抗衡。

目前中广核、中核、国核正在研发自己的三代技术。中广核的 ACPR-1000 是在 CPR-1000 的基础上研发的，而 CPR-1000 技术是基于阿海珐的 M310 反应堆技术研发而成。ACPR-1000 在阳江 5 号机组得以应用，该机组于 2013 年 3 月开始建造。UxC 公司认为这种技术可能会存在知识产权纠纷，因此会使其出口该技术变得尤为复杂。

中核集团的 ACP-1000 是在 CPR-1000 的基础上研发的，CPR-1000 技术是在 CNP-600 技术的基础上研发而成，该技术在秦山二期项目有所应用，因此不会产生产权纠纷。中核计划将 ACP-1000 技术首次应用于其福清 5&6 机组，该项目预计于 2013 年年底动工。

国核的 CAP1400 技术是在西屋 AP1000 的基础上研发出来的。国核称其拥有该项技术的知识产权，而西屋对此持不同观点。CAP1400 技术将在石岛湾核电站得以应用，动工时间预计在 2014 年。就以上提到的三种技术而言，近期最有可能实现出口的是 CAP1400。不过由于 ACP-1000 的成本相对较低，也有可能成为一些国家选择的对象。

出口时机

国核已经完成了 CAP1400 的研发工作，目前正在进行可行性研究，计划今年申请建造。该申请通过后，预计今年就可能开始动工，但也有延期的可能。以韩国为例，韩国电力公司于 2009 年将其 APR-1400 技术转让给了阿联酋，但是其第一个 APR-1400 技术仍在建造阶段。该技术于 2006 年获得了韩国当局的审批同意，并于 2008 年获得建造许可。以此来看，中国的 CAP1400 技术将于未来 3 到 4 年实现出口。中国还可以申请获得美国核管理委员会的设计证书以加其 CAP1400 技术在国际的市场竞争力。ACPR-1000 和 ACP-1000 的出口时机取决于何时获得国内的许可执照，以及何时应用于中国核电项目。

分析

福岛事故对中国核电市场产生了重大影响，之后的中国新兴反应堆项目的申请流程被搁置了 18 个月之久。此外中国颁布的核电安全计划大纲决定其从二代加技术向三代技术的转型。到 2016 年之前（既 12.5 计划期间），中国的反应堆将集中于三代、四代、进口反应堆技术，少数可能还会应用二代加技术。

由于中国核电技术的转型（主要是从二代技术转向二代加技术），中国核电建设速度开始放缓。中国核电产业在国内没有足够的项目可以投资，因此大型核电公司开始转向海外寻求机会。中广核资金雄厚，积极寻求海外项目机会。如果海外项目可以接纳二代加技术，中广核将会大展身手。

然而，现在只有三代技术在国外有较好的发展机会。在国核的带领下，中国正在对西屋的 AP1000 技术进行吸收和再创造，以研发出属于中国自己的 CAP1400 技术。与中核和中广核的技术相比，国核的 CAP1400 实现出口的可能性更大（巴基斯坦项目除外）。未来几十年对于中国来说至关重要，中国将以 NSSS 系统供应国的身份进驻国际市场。近年来 AP1000 项目的成功建造、CAP1400 示范项目、三代技术的设备研发和技术转让项目将会成为中国跻身国际核电市场前列重要因素。与此同时，中国将可能以投资者或其以一种支持的角色首次参与到国际项目中来。

压制完美的燃料芯块

作者：Tonie Van Zegbroeck

（1）简介

自 1969 年以来，比利时压片机制造商 Courtoy 公司，现如今的 GEA 公司，就一直为 UO2 与 MOX 核燃料工厂提供填料和造粒技术。 Courtoy ™ 的燃料压片机占超过全球核电市场 90％的份额，GEA 与遍布世界各地的燃料厂有着密切的联系，这使 GEA 能够跟进新的需求和行业内的进展。在过去，燃料球芯块产生于液压的单冲程压片机。这项技术有不少缺陷，包括低输出性能，溢油的风险，模具填充不均匀，粉末流频繁中断。正是发现了这些不可接受的缺陷，因此 Courtoy ™ 压片机设计团队就率先对芯块压缩过程进行了相应的改进和改革。

（2）UO2（二氧化铀）芯块压片机的主要设备性能要求

主要的设备性能要求是在指定的窄密度频带和长度的限制内，同时最小化产品的密度梯度的条件下生产始终如一完美无瑕的燃料芯块。其目的是为了尽量减少研磨烧结块，从而减少缺陷的样品的数量。

为了满足这些要求：

- 模具需要不断的进行填补，
- 冲头的上部和下部上的压缩力需要一致并保持平稳，
- 粉末需要进行润滑或在填充粉末前模壁需要使用润滑膜，
- 在芯块排出阶段，芯块必须保持负荷下状态以避免芯块封端，
- 芯块排出阶段后，粒料需要排列等待转载，然后转移进入烧结炉。

下面是关于 Courtoy ™ 为应对这些挑战所提出的创新型解决办法的扼要介绍。

2.1 模具填充

多年来，Courtoy ™ 的工程师们通过与客户合作已经开发出不同的送粉机制。由于高密度，在粉尘器的排空过程中送料机的排出压力不断变化，显著地影响着模具内的粉末数量。 而 Courtoy ™ 新研发的粉末料阀就可以使送料机在此过程中保持恒定的排出压力，从而避免了压力机控制系统的连续无功校正。一个封闭的双桨强制给料机能够实现稳定地充模并减少粉量流传至平台，从而提高容量。

2.2 恒定密度压缩

空气补偿器是 Courtoy ™ 公司压片机独有的一个特色，与压辊的顶部和底部相连接并起到缓冲的功能。在每个芯块压缩循环中，辊轴仅移动几十分之一毫米，以确保每一次压缩都是在设定的补偿压力下进行。每个芯块将被压制成相同的密度并且高度的变化将反映出模具填充和粉末属性的不同。

2.3 芯块密度和长度公差的控制

2.3.1 基于芯块体积的压片机控制系统

直至最近，Courtoy ™公司的压片机燃料芯块控制系统才真正基于在一个恒定的压缩力下保持一个恒定的体积。当在恒定的压缩力下进行芯块压缩时，芯块的长度将与它的重量成正比。芯块长度被定义为压缩位置的冲头之间的固定距离，随着底部和顶部的补偿位移而增加，由用底部和顶部冲头的凸起来调整。当芯块长度发生变化，例如，充模不足，粉配料凸轮位置将会发生改变，直到底部和顶部的补偿位移的返回至正常值。芯块密度可以改变整个粉末批次，这就要求压片机进行相应的调整。在上面所描述的压片机控制系统中，操作员，将绕过自动控制模式并通过改变顶部和底部的补偿器的压力来进行调整，重复按 + / - 按钮直到密度再次达到预定的范围。这种做法偶尔会导致芯块浪费。在自动模式下，改变压缩力将意味着补偿位移的变化，这就将激活上述定量给料凸轮控制回路，结果芯块的长度就发生变化。

2.3.2 恒定密度压片机控制系统

手动密度输入

Courtoy ™公司密度控制系统允许操作者手动将密度输入到压片机控制系统，在他 / 她已测量和称重一对片剂并计算出芯块密度后。然后控制系统将以一个比操作员更快的方式来校正压缩力而不影响补偿位移。

自动密度输入

一个自动化的密度采样器可以被安装在起飞轮后，但却仍然在机箱内。采样器是用来测量每个芯块的高度和直径，重量约 20 片 / 分钟。芯块尺寸和重量被用来计算其真实密度。如果校正阈值交叉，该数据会被连续地反馈到压片机控制系统，以调整芯块的密度和长度。所有这些信息都存储在一个数据库中进行批次验证，也可用于显示趋势图和柱状图。片剂的数据也与转台上压片机的位置相联系，检测任何有缺陷的穿孔技巧。

2.4 芯块排出

在压缩过程中，显著的压缩力被传送到模壁上。如果模壁不够润滑，粘滑运动就会在芯块排出过程中产生。有两种解决方案可用于预防这种情况：在粉末中混入润滑剂或润滑剂以受控的稀油或油脂膜的形式通过下膜冲附着在模壁上。此膜通过排出口和过满位置之间的的下膜冲沉积而成。在这两种情况下，润滑剂在烧结过程中被燃烧。随着模壁不断下滑脱落，片剂就会从模具中出来。为了避免封端，需施加保持力，并且保持力会随着芯块逐渐排出模具而不断减弱。

（3）MOX 芯块压片机的主要要求

除了要满足上述所提及的主要要求（适用于 MOX 芯块压片机以及 UO2 压片机），MOX 芯块压片还需要进一步满足以下三个关键的要求：

• 全密封的压缩空间，
• 最小化操作员干预，
• 排除使用快速衰减性塑料。

3.1 完全密封

压缩空间必须完全密封，在机械压力机领域，需使用密封圈和 HEPA 集尘过滤器。压片机外壳被一个手套式操作箱替代，用于操作员干预。需提供快速传输端口（RTP）以用于零部件和模具的转移。此手套式操作箱内部的维护需最小化，通过在外部设置大量的电机和传感器来实现。

对于压片机来说，也是同理，在饲料和芯块口的粉末也需要受到控制。建议使用中型散装容器（IBC），IBC 配备有分体式蝶阀，包含对接和脱开功能。这些中型散货箱也可以用于在大玻璃杯中混合润滑剂物，并且也可以被定位，然后在压片机上采用后固定方式。

3.2 操作员干预最小化

由于处理限制在手套式操作箱中内，转换部件应易于拆卸。手套式操作箱的设计必须易于接近所有的介入点，同时要考虑到可拆卸冲压件的重量。

3.3 排除使用快速衰减塑料

用不锈钢管来取代所有润滑塑料管。

（4）辅助设备性能要求

除了生产量和粉末容量的要因素，对于磨料粉末来说，压片机的可靠性，稳健性和生命周期都是很重要的方面。考虑到这些要求，Courtoy ™ 压片机完善的超长使用寿命与 Courtoy ™ 公司客户关怀部门所提供的服务也成为了企业发展的关键资产。

4.1 使用寿命及零配件

压片机的处置成本是相当高的，机器的寿命是选购时需要考虑的一个重要方面。 Courtoy ™ 公司在 1969 制造的第一个交付给核工业使用的旋转式压片机现在仍然在加拿大 Cameco 公司作为填料压片机在运作。当时交付设备时所需的备件现在仍有供应，且这些零部件具备了 20 年的使用保证，现在某些电子元件可能已经过时，因此，就要求升级控制系统。

R53 压片机正在被重新设计，以增加与压片机底座的距离，并减少不同备件的数量。而压缩过程始终并未改变。

4.2 客户关怀服务

GEA 的 Courtoy ™ 客户服务团队拥有很多核电压片机专家，负责协助客户进行压片机安装，培训，维修和预防性维护。

（5）制造具有中央孔芯块的具体要求

制造具有中心孔的芯块通常使用芯杆，芯杆是由下冲头支撑和集中的。在完成压缩循环期间，芯杆保持与模具表面齐平。在充填时，粉末围绕芯棒流进模具。有时，粉末留在芯棒的顶部，需由刮刀擦去。带有中模孔的上冲头关闭模具，将药粉压制成片。须仔细选择芯杆的材料特性和表面光洁度，以避免芯块在排出过程中芯杆破裂。

新闻 NEWS

重点新闻

亚洲发展将推高全球能源需求

据美国能源信息署（EIA）称，2010 至 2040 年期间，全球能源消耗总量将增长 56%，其中核电总量将翻番，煤电仍将占据主导地位。

EIA《2013 国际能源瞭望》最新公布的参考案例显示，2010 年全球能源消耗总量为 524 千万亿英热单位 (Btu)，到 2040 年这一数字将跃升至 820 千万亿英热单位。

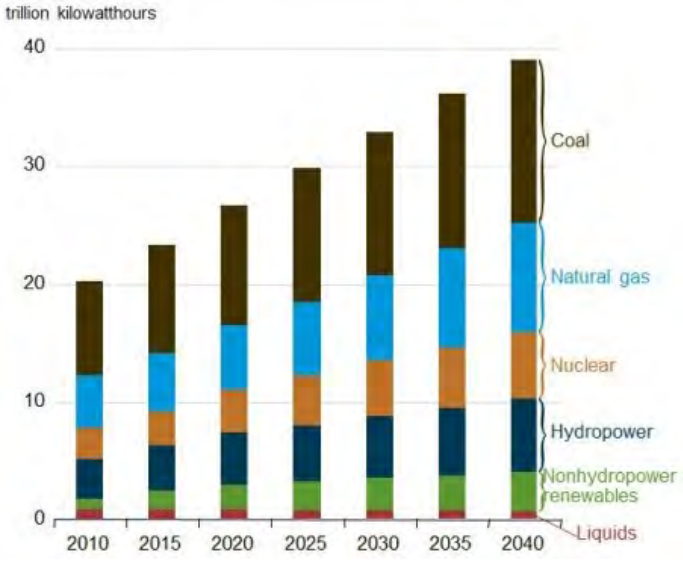
能源消耗增长主要集中在亚洲、中东国家等非经合组织地区：到 2040 年，非经合组织地区对能源的总需求量将增加 90%，其中印度和中国将占据半壁江山。而与此同时，经合组织成员国的能源消耗预计将仅增加 17% EIA 的管理人员亚达·西米尼斯基（Adam Sieminski）表示，“在展望全球能源需求时，中国和印度未来的繁荣发展是一个重要的考虑因素”，“这将对全球能源市场产生重大影响。”

发电量

美国能源部数据分析机构 EIA 表示，到 2040 年全球发电总量将达到 39000 TWh（太瓦时），与 2010 年相比增长 93 个百分点。所有能源中，增速最快的是可再生能源（包括水电、风能和太阳能）及核能，预计这些能源在 2010 年至 2040 年期间将实现 2.5% 的年增长率。

据估计，核电厂发电总量将从 2010 年的 2620TWh 增长至 2040 年的 5492TWh。核能发电量将大幅增加，其中中国将增加 149 GWe（千兆瓦），印度 47GWe，俄罗斯 31 GWe，韩国 27 GWe。尽管如此，核电在全球发电总量中的比重将仅从原先的 13% 增至 14%。同时，可再生能源将从 2010 年占全球发电总量的 21% 增加至 2040 年的 25%，天然气比重从 22% 上升到 24%，而煤电则因各国纷纷转向更加清洁的能源，由 40% 下降至 36%。EIA 认为，“如果将来出台减少或限制温室气体排放增长的国家政策或国际协议，煤炭消耗量将大幅降低。”即便如此，2040 年以前煤仍将是最主要的发电燃料。

EIA 表示：“根据现有的化石能源使用限制政策和规定，预计到 2040 年全球能源相关的二氧化碳总排放量将增加到 450 亿吨，与 2010 年的 310



吨相比上升 46%”。同时，EIA 还提醒称，煤炭仍是二氧化碳排放的最大来源。

来源：http://www.heneng.net.cn

中广核先进固废处理技术通过验收填补国内空白

2013 年 8 月 2 日，中国广核集团所属中科华核电技术研究院在湖南省长沙市组织召开了科研尖峰计划“核电站等离子体熔融减容技术研究项目”专家验收会，中国原子能科学研究院等七家科研单位组成的专家组对该项目进行了验收。与会专家在认真听取项目组的汇报后，审阅研发资料，现场检查整套试验系统，并见证了等离子体熔融试验，认为等离子体熔融减容技术研究项目已完成研发，同意通过验收。

等离子体熔融减容技术利用热等离子体具有较高温度和能量密度的特点，快速将废物进行高温裂解，其产物为玻璃态无机物，所产生的气体通过高温环境下的还原反应，分解为原子和最简单的分子，最重要的是其中有毒有机物尤其是二噁英和呋喃都被彻底分解为无毒的小分子物质。若用于核电站，则中低放固体废物中存在的放射性核素完全被包覆在玻璃态熔渣内，产物为无机化的稳定状态。等离子体熔融减容技术具有减容比高、产物稳定、不产生二次污染等突出优点，是目前国际上公认的放射性固废先进处理技术之一，该项目研究成果同时可用于医疗等特种垃圾熔融的工程应用。

等离子体熔融减容技术在国外电站已得到工程实际应用，而国内尚属空白。2009 年，中科华核电技术研究院承接该计划项目，成为国内首家开展核电站放射性固废等离子体熔融减容技术研究的企业，通过 3 年多的自主研发，完全掌握了等离子体发生器、熔融炉、玻璃化配方、尾气处理等该固废处理所需的全套核心技术，中广核拥有完全自主知识产权。

本次验收的通过，也标志着国内首套面向核电站中低放固废处理的等离子体熔融减容系统正式建成，标志着中广核已全面掌握了这一安全、经济的

固废处理技术。

来源：http://www.cgnpc.com.cn

核电“走出去”应成为国家战略

我国核电经过近30年的发展，已经具备完整的产业链条并拥有自主知识产权的核电品牌，核电出口已经具备了成熟的条件与时机。国内核电产业界也充分认识到核电“走出去”的重要性与紧迫性，纷纷呼吁应把核电“走出去”上升为国家战略。

核电“走出去”的必备条件是拥有自主知识产权的核电品牌，国家核电技术公司开发的CAP1400已经具备这一条件。CAP1400是具有中国自主知识产权的三代先进核电技术品牌，它涵盖了三代非能动技术的先进性、安全性、经济性、可靠性和高环保性，也包括了中国产业界具备的强大工程建设能力、设备制造能力与投融资能力，既是先进的中国概念，又有深厚的国际先进技术积淀，具备成为国家品牌、国际品牌的核心要素。按照重大专项研发和示范工程建设的进展，CAP1400示范工程已经获得国家发改委批复同意开展前期工作，并计划2014年4月浇灌第一罐混凝土，2018年年底建成投产。同时，中核集团与中广核集团也在积极开发自己的核电品牌。

由于我国已具有核工业全产业链的服务能力，且具有更低的建造成本和服务成本，比其他国家更具出口优势，一些计划发展核电的国家，对引进我国百万千瓦核电站已表现出浓厚的兴趣。而目前国内三大核电集团出口意愿强烈，个个摩拳擦掌，准备向国际市场进军。此时，核电出口上升到国家层面有助于整合国内业界资源与力量，避免形成国内企业分散努力、互相竞争的局面。

多方协作力推核电“走出去”

通过今年以来有关核电“走出去”的言论可以看出，国内三大核电集团已经认识到核电“走出去”离不开政府强有力的支持。当前，三大核电集团以及设备供应商应该为了国家的利益，同时也是为了自身的发展，应统一思想，团结一致，形成合力，力推政府尽快制定“走出去”政策。

国外经验表明，拿下国外核电订单，都离不开政府与首脑的大力推动。建议三大核电集团通过各种渠道，努力推动我国领导人在互访活动中将核电合作纳入双方的议程中。综合利用我国的政治、经济、外交等影响力，争取早日拿下海外订单。

此外，充分认识并利用驻外使领馆在驻在国核电需求的信息搜集、开展日常交流与合作方面的重要作用。建议核电企业与驻外使领馆加强联系，争取在驻外使领馆商务参赞处常年备案并设立我国核电技术展示窗口，推动使领馆与驻在国对口单位在核能方面开展日常交流与合作，争取形成长久性机制。

来源：http://news.bjx.com.cn

首台CPR1000项目国产化余热排出泵在沈下线

8月6日，首台CPR1000项目国产化余热排出泵——红沿河核电站3号机组余热排出泵，从沈鼓集团核电泵业有限公司顺利下线并发运。该产品性能指标达到国际先进水平，在核级泵国产化进程中具有里程碑意义。

来源：http://www.lhnp.com.cn

大型先进压水堆两项科研课题通过预验收

日前，大型先进压水堆重大专项科研课题“AP1000核岛重大关键设计技术研究”、“AP1000核岛关键设备设计技术研究”在上海通过了预验收。

预验收专家组由中国工程院院士叶奇蓁、中国机械工业联合会总工程师隋永滨和20余名国内知名核电技术专家组成。专家组一致认为，两个课题均实现了合同任务书预定的研究目标和内容，完成了规定的考核指标，同意通过预验收。这标志着我国掌握了国际第三代核电的先进核岛设计技术体系，已具备AP1000核岛的自主设计能力。

压水堆重大专项包括AP1000技术消化吸收、CAP1400技术研发、CAP1700技术预研、压水堆共性技术、条件保障等五类科研课题。此次预验收的两个课题属于AP1000技术消化吸收类课题，共设置15个子课题、55个专题，形成的技术文件共1700余份，研究的技术创新成果已用于AP1000后续项目、部分用于AP1000依托项目。

来源：http://www.cfhi.com

国开行贷款160亿元支持田湾核电站建设

8月12日，国家开发银行江苏分行与江苏核电公司正式签订田湾核电站二期工程项目贷款协议，在金融同业中率先提供巨额融资支持。根据协议，国开行江苏分行将为江苏田湾核电站二期建设提供约160亿元的贷款支持。

国开行对田湾核电站的支持最早可追溯到1999年。当时，田湾核电站一期工程机组刚刚开始建设，国开行江苏分行作为主力融资银行，率先向该项目提供了45亿元长期贷款，在金融同行业中发挥了很好的示范和引导作用。

来源：http://www.chinabidding.com

高温气冷堆核电站示范工程燃料元件厂房封顶

近日，在包头市新建的我国高温气冷堆核电站示范工程燃料元件生产线厂房封顶。该示范工程是国家“十一五”重大科技专项工程，由中核北方核燃料元件有限公司投资2.75亿元建设，规划建设1条年产30万个球形燃料元件生产线，为20万千瓦模块式高温气冷堆核电站示范工程提供燃料元件，并为今后商用高温气冷堆核电站的燃料元件生产积累技术经验。该生产线计划2015年10月试生产，2016年建成投产。

来源：http://www.china-nea.cn

我国研发出核聚变实验堆超导电缆导体

8月16日，在国际热核聚变实验堆（ITER）计划总部官员的现场监造下，765米CB超导电缆导体在白银有色长通公司下线。这条导体是ITER装置中运行的最大长度超导缆。

ITER装置是产生大规模核聚变反应的超导托克马克，旨在建立人类可持续的清洁能源体系，俗称“人造太阳”。2003年1月，中国政府正式参加ITER计划谈判，成为该计划合作成员之一。根据协议，我国将承担70%管装

电缆导体的生产量。

超导电缆导体是ITER装置中超导电缆的核心部分，按一定的绞合参数，将0.73毫米直径的低温超导材料及金属单线分5级绞合成多股导体。“每级绞合的参数都要上传到ITER数据系统，通过项目官员的分析确认。”长通公司高级工程师李英姿介绍说。

长通公司项目组在研制中优化了紧压、扭绞、拉伸、接头和焊接等工艺参数，强化了技术质量控制。这条新电缆导体将于近日运抵中科院合肥物质研究院，完成穿管后送至ITER法国总部安装。

白银有色长通公司是我国电线电缆行业的骨干企业。该公司研制生产的各类高低温超导电缆成功应用在航天、新能源和物理基础研究等领域，今年已经向ITER提供的4条CB、PF5型号电缆导体，均已组装运行。

来源：http://www.cnnc.com.cn

能源局：内陆核电于沿海核电无本质差别

全球在运442台 核电 机组中，内陆核电机组数量约占50%。其中，美国共104台机组，内陆核电88台，占美国所有核电机组的84.6%；法国共59台机组，内陆核电41台，占69.5%；俄罗斯共31台机组，内陆核电占58%；乌克兰共19台机组全部建在内陆。

国内外对内陆与沿海发展核电的要求没有本质差别。无论国际原子能机构、各主要核电国家，还是我国有关核安全法规要求，对滨海核电站和内陆核电站在安全目标和评价准则上是完全相同的。没有任何国家和组织对内陆核电提出过非同一般的特殊要求。

由于环境条件的差异性，内陆核电站建设中有一些需要特别关注的问题。主要包括：液态放射性流出物的排放控制，人口分布与实施应急计划的可行性，散热系统运行的影响，大件运输条件，水资源论证和安全厂用水源设置等。只要在选址阶段对这些问题进行深入评价，并采取合适的 管理 措施和技术措施，就完全能够确保最终选定厂址满足有关法规和建厂条件的要求。

来源：http://www.cni23.com

自主化非能动系列核电厂人员闸门样机通过鉴定

2013年8月16日，“自主化非能动系列核电厂人员闸门样机”在大连通过了中国核能行业协会组织的成果鉴定。鉴定意见认为，人员闸门样机具有自主知识产权，达到了国际先进水平，该成果可应用于CAP系列以及其他核电工程项目。

“自主化非能动系列核电厂人员闸门样机”是国家重大专项的子课题，由上海核工程研究设计院和大连宝原核设备有限公司共同承担并开展研制工作。该课题结合美国西屋公司的技术要求和实际工程经验，遵循国家标准和ASME规范，完成了样机的设计和制造，并进行了各类试验。

来源：http://www.china-nea.cn

企业新闻

核燃料公司燃料元件设计所在核动力院挂牌成立

8 月 1 日，中国核燃料有限公司燃料元件研究设计所在中国核动力研究设计院挂牌成立。此举旨在进一步发挥中核集团核燃料元件领域设计、试验、关键材料、辐照考验、制造工艺的体系优势，推进元件领域科研成果向工业应用的及时转化，提升集团公司核燃料元件产业的核心竞争力，进而推动我国核燃料元件领域产业技术发展。

据悉，核燃料元件研究设计所由中国核燃料有限公司领导，下设燃料元件研究设计室、燃料元件堆外试验室、燃料元件辐照考验室、燃料元件材料研究室、燃料元件制造工艺研究室、燃料元件产业化研究室和综合管理部等部门，主要通过承担相关科研项目、工程化任务和开展国际合作交流等，加强核燃料元件设计技术及其关键材料的研究开发，形成自主品牌燃料元件，并实现产业化发展。挂牌仪式前，燃料元件研究设计所成立了第一届理事会，通过了理事会章程，推举出第一届所领导班子和专家委员会。

中核集团副总工程师、核燃料公司党委书记李广长，以及核燃料公司，中核建中核燃料元件有限公司、中核北方核燃料元件有限公司、核动力院等相关领导参加挂牌仪式。

来源：http://news.bjx.com.cn

中核集团总工程师雷增光出席挂牌仪式，并向燃料元件研究设计所授牌
来源：CNNC

纽威与上海核工院签署三代核电样机联合研发协议

2013 年 7 月 26 日，纽威阀门与上海核工程研究设计院在苏州举行第三代先进核电厂主蒸汽安全阀重大专项阀门研发及 CAP 系列核级阀门研发协议签字仪式。上海核工院在郑明光院长、顾国兴副院长带领下，一行 6 人参加了签字仪式 。纽威集团王保庆董事长、陆斌总经理、席超总经理、高开科总工程师以及阀门核电阀事业部王龙骧总经理等参加签字仪式。

CAP 系列核电技术是国家核电上海核工程研究设计院在消化吸收美国西屋世界最先进的第三代核电技术 AP1000 基础上，再创新，具有自主知识产权的先进核电技术。纽威阀门将依托上海核工程设计研究院核电技术支持和服务，开发具有国际先进水平的 CAP 系列稳压器主蒸汽安全阀、核一级电动闸阀、核一级旋启式止回阀和核二级气动球阀，进一步扩充纽威核级阀门产品资质范围，提升纽威核电阀门产品技术、质量水平，增强在核电阀门市场上的竞争力。

来源：http://www.valve-world-asia.com

中电投控股核电装机容量已近 700 万千瓦

中电投集团 8 月 7 日发布新闻稿称，作为五大发电集团中唯一具有控股建设核电站资质的企业，发展核电已成为中电投清洁能源战略重要组成部分。目前，集团等比例控股运行核电装机容量 112 万千瓦，控股和等比例控股在建核电装机 586 万千瓦；参股运行核电装机 108 万千瓦，参股在建核电装机 103 万千瓦。

按照规划，到 2020 年，中电投投运核电装机容量将达到 1400 万千瓦，在建核电装机容量将达 1000 万千瓦。目前，中电投除了和中广核集团等比例控股投资运营红沿河核电站，还控股建设山东海阳核电项目。

截至 2012 年底，中电投电力装机容量达到 8000 万千瓦，其中清洁能源比重已达 31.04%。而根据中电投战略规划，这一比例到 2015 年将达到 40%，到 2020 年将达到 50%。

中电投为五大国有发电集团之一，旗下全资及控股上市公司包括中国电力（02380.HK）、中电远达（600292.SH）、上海电力（600021.SH）、吉电股份（000875.SZ）、漳泽电力（000767.SZ）及露天煤业（002128.SZ）。

来源：http://www.china-nea.cn

中广核自主研制的“百万千瓦级核电厂全范围模拟机”获专项资金支持

经过专家严格评审，中广核仿真公司申报的“百万千瓦级核电厂全范围模拟机”成果转化项目在全北京市众多申报项目中脱颖而出，获得了 2013 年北京市高新技术成果转化专项资金支持。

北京市高新技术成果转化专项资金，是北京市科委为贯彻落实《北京市人民政府关于进一步加大统筹力度支持高技术产业发展的若干意见》，促进高新技术成果在京转化，带动战略性新兴产业发展设立的。

中广核仿真公司自主研制的“百万千瓦级核电厂全范围模拟机”曾荣获 2011 年“国家能源科技进步奖”、2012 年“国家重点新产品”认定证书。目前，该成果已成功应用于宁德核电、阳江核电、防城港核电、核与辐射安全中心等模拟机项目。

来源：http://www.cgnpc.com.cn

龙电核电特种门成功用于昌江核电厂

近日，深圳市龙电科技实业有限公司（简称龙电）生产的核电特种门设备成功应用于海南昌江核电站厂建设。

目前我国对核电特种门的要求主要集中在气密性能、防火性能、抗震性能三大方面。龙电核电特种门采用了具有特大重型铰链及齿轮齿条传动锁栓机构设计，能够满足峰值温度为225℃时的密封要求。

来源：http://news.bjx.com.cn

中核苏阀 AP1000 爆破阀模拟件通过整机性能试验

8月13日，中核苏阀科技实业股份有限公司向国家核安全局申请扩证的AP1000爆破阀模拟件进行了整机性能试验。该项试验是获取国家核安全局AP1000爆破阀制造许可证的关键节点，试验的成功意味着该公司已经具备了获取AP1000爆破阀（14吋）制造许可证的条件。

此次试验获得了预期的结果，阀门成功打开。此外，中国核动力研究设计院还对阀门动作载荷进行了测试以评估阀门动作时对管道的影响，测试结果显示满足设计要求。

国家核安全局的专家见证了试验整个过程，上海核工程研究设计院、国家核电工程有限公司的专家也到场观摩。

来源：http://www.cnnc.com.cn

核电关联企业核级不锈钢首炼告捷

近日，海盐县核电关联企业浙江中达特钢股份有限公司成功冶炼出首批核2、3级用不锈钢。这是中达特钢自今年获得核级生产许可证后生产的首批次核级钢种。据悉，该钢种是制造核级仪表管的重要金属材料，本次冶炼成功，为核级仪表管的国产化奠定了重要基础。目前，中达特钢正全力以赴开展该核级仪表管的研制工作。

来源：http://www.cnnc.com.cn

远东三项产品通过中电联鉴定

2013年8月3日，中国电力企业联合会在北京组织召开了远东电缆有限公司和江苏新远东电缆有限公司研制的“JLHA2X/G1A-1040/75-395钢芯铝合金型线绞线”、“JNRLH1/LBY14(TACIR/AW)-400/50-54/7铝包殷钢芯耐热铝合金绞线”、“OPGW-24B1-240［294；276］光纤复合架空地线”新产品技术鉴定会。

远东电缆有限公司首席技术官汪传斌、科研管理部资深总监胡清平、架空导线研发部副总监徐静及相关研发人员参加了鉴定会。鉴定委员会由来自中国电力科学研究院、中国电力工程顾问集团公司、国家电网公司、上海电缆研究所、华北电力设计院、华东电力设计院、中南电力设计院、江苏省电力公司、广东电网公司和浙江省电力试验研究院等单位的16位专家组成。

鉴定委员会听取了研制总结等报告，审查了鉴定资料，专家检验组先期考察了生产现场并进行了现场抽样检测。委员会认为“JLHA2X/G1A-1040/75-395钢芯铝合金型线绞线” 产品采用镀锌钢线和高强度铝合金（SZ）型线绞，结构合理，表面光滑紧密，强度大，提高电网抗灾能力，能满足在各种恶劣气候条件下大容量、远距离送电要求。“JNRLH1/LBY14(TACIR/AW)-400/50-54/7铝包殷钢芯耐热铝合金绞线”产品采用铝包殷钢线和耐热铝合金线绞制，结构合理、弧垂小、耐热性能好等特性。鉴定委员会认为这两项产品综合技术性能已达到国际先进水平，并同意通过技术鉴定。

产品经电力工业电力工程材料部件质量检验测试中心、中国电力科学研究院和上海电缆研究所电工材料及特种线缆质检中心进行型式试验，各项性能指标均符合国家有关标准和企业标准要求。

来源：http://www.fe-cable.com

ABO 阀门公司在中国建立分公司

ABO阀门公司是以捷克共和国为基地的中心及高性能蝶阀生产专家，将继续专注于更遥远的亚洲市场。伴随销售额在亚洲地区的迅速扩大，2013年8月，ABO在中国上海开设了其分公司。2010年在新加坡设立了其在东南亚地区的第一家分公司。

ABO为中国不同的污水处理项目以及石油仓储项目提供中心以及高性能蝶阀。在亚洲的其他项目分布在印度尼西亚，ABO为水泥厂与污水处理厂提供水冷却系统，同时也分布在越南，在那里ABO为浮式生产储卸油系统（FPSO）提供产品。这些项目中的很多领域 – 特别是在那些海上钻井平台，油库，污水处理和海洋产业领域 – 都是由ABO新加坡分公司直接支持的。

ABO全球商业总监Miro说：“在过去的三年里，我们成功地以平均每年27%的增长速度发展。目前我们的销售在高性能阀门产品的带动下增长，来供应不同的复杂项目，包括水处理，石油和天然气的运输和储存与并网发电等各个领域。在新加坡分公司的支持下，我们在中国建立的分公司将更加有效的覆盖充满希望的中国市场。”

来源：http://www.valve-world.net

中国核建与中科院签署合作协议

8月15日，中国核工业建设集团公司与中国科学院签署科技合作框架协议，为双方搭建了新的科技交流合作平台。

中国核建集团公司党组书记、总经理、股份公司董事长王寿君，中国科学院副院长詹文龙院士出席签字仪式并致辞。中国核建集团公司党组成员、副总经理、股份公司总裁祖斌与中国科学院副院长詹文龙院士代表双方签字。

中国核建与中科院签署的科技合作框架协议涉及核技术应用、核研究基地及设施建设、先进核反应堆技术研发、军工工程技术的研究和应用等多个重点技术领域。

签约仪式上，核建清洁能源有限公司总经理何剑与中国科学院近代物理研究所所长肖国青就科研成果产业化开展合作签署协议。

来源：http://news.bjx.com.cn

我们的专业:

技术咨询

五年核能领域的经验使代邦能源形成一支负责核电设备认证咨询服务的专业技术团队，包括中国的HAF 604（关于进口民用核安全相关设备的条例）和 HAF 601（民用核安全设备的设计，制造，安装，无损检测监督管理）认证。为了满足中国核电工业的所有规定要求，符合这些认证是必要的。

我们的服务:

- 制定规划--为技术认证提供一套完整的战略，翻译每份文件，并根据核安全当局的要求调整认证申请。
- 分析与说明-- 在复审的过程中与负责审查的调控人员与技术支持单位保持定期的交流。
- 现场审查--我们的工程师会现场协助您的质量控制经理回答审查人员的询问，尤其是HAF 601认证。
- 行政支持--对于特殊的进口许可证，我们会利用与买家及当局的良好关系，确保合法交易的顺利进行。

想要获得更多信息请联系我们: info@dynabondpowertech.com
http://www.dynabondpowertech.com/en/service/certificate-for-civil-nuclear-equipment

国际合作

丁健会见加拿大原子能公司外宾

2013年8月7日上午，公司总经理助理、北京核工程研究设计院院长丁健，在公司七层第三会议室会见了前来拜访的加拿大原子能公司（AECL）CANDU 6（EC6）项目负责人Mike Soulard一行，陪同来访的还有AECL公司核安全系统专家聂春雷等人。

丁健首先对Mike Soulard一行的来访表示欢迎，双方表达了友好的问候，说明了本次会见的背景和需要讨论的问题。丁健就公司总体情况、综合能力、现有项目的执行以及设计院情况进行了简介。Mike Soulard介绍了AECL公司和CANDU 6(EC6)项目的基本情况。双方就感兴趣的话题展开了深入的讨论。

双方均表示愿进一步加深了解、密切联系、增进合作。公司总经理办公室、设计院相关人员出席了当天的会见活动。

来源：http://www.cnpe.cc

Sandvik在中国所有的管材产品

中国最近的核级导入认证（HAF 604）允许Sandvik材料技术公司出售在瑞典工厂Sandviken制造的核级应用管材产品，以及已经在中国出售多年的蒸汽发生器和燃料包壳管。近期合同包括为台山EPR项目供应商与AP1000三门核电站2号机组和咸宁机组承包商提供的690合金蒸汽发生器管。

全球核管和管道销售与营销经理， Mikael BLAZQUEZ说到，“这不是一个性感的名字，但如果你把蒸汽发生器和燃料管从核电站拿出，那么留在核电站里的才是核分类管热器，冷凝器，液压系统，仪表系统等这些类型的应用。（管与管道之间没有区别，除了管道更大一些以外。Sandvik提供从直径在6mm-260mm之间不等的产品，管壁厚度小于0.1毫米）。

BLAZQUEZ预计每个新反应堆需要的的管材和管件可达1000吨。在中国有28个反应堆正在建设当中，在未来几年中，根据UXC公司的市场调查，另有17个核电站将开工建设，预计在2020年前完成58万千瓦的核电装机容量，以满足目标市场的需求。

作为高度工程化管材产品的成熟供应商，Sandvik接近需要管材产品的制造商以供应中国核电新市场的方法很简单：就是质量。BLAZQUEZ说：“我们作为一个专注于最严格规范的公司。在核电厂中有很多管和管材产品，但并不是所有的产品都为核级产品。” 他又补充说到：“我们致力于接近反应堆核心的区域，这些区域需要更高的安全等级和更为严格的要求。这就使我们的目标领域缩小。”

核级管和管道的其他供应商也包括法国的Valinox Nucléaire，其产品也在中国销售，还包括美国的Plymouth公司和日本的Sumitomo金属有限公司。

BLAZQUEZ 坦言中国的核电市场并不像人们可能会认为的那样对价格很敏感。他说：“中国当局非常重视安全性方面，在福岛核事故后，他们是世界上第一个采取强有力行动的国家，他们采取项目搁置，并做全面安全审查，并且行动非常迅速。中国客户都非常渴望拥有良好的品质。在我们与客户的讨论时，价格的确是很重要的一点，但是它却从来没有赢得过质量。”

Blazquez说物流是对于中国新建核电市场供应商来说的至关重要的第二个因素。交货地点比交货时间更为重要。只要施工人员将要开始其工作，产品就必须交付到指定位置。“如果你说你将提供，你必须按时交货。”Sandvik向制造商供应管和管道产品，并用它们来组建核电站部件和子组件。正如Blazquez所说的那样，由于管道需要部件与部件之间相连接，因此Sandvik也提供焊接材料并与合格的伙伴进行合作来提供相应管道的配套产品，如配件或法兰，作为设备包的一部分。

反之，那么他说在现有的设计中产品就没有更多的发展了，因为这个行业是如此的保守，创新通常只发生在当时的新的核电站的设计发展当中，其余的时间供应商必须紧扣客户所要求的规格。 达到所要求的质量绝非易事。“我们必须符合每批次的产品规格，甚至每一根管，每时每刻。对于材料性能，尺寸公差或表面，甚至管把都有非常严格的要求。在整个生产过程中，这些管道产品都必须通过具体的方式进行处理。“

他介绍了公司的质量控制流程，熔体阶段（材料内容分析），通过生产的每个阶段，包括挤压，pilgering（轧制压力下），退火，矫直，酸洗，检验，测试和标记。在整个过程中，工人编译完成附有大量邮票和测试报告的‘历史书’卷宗。Blazquez说“大部分内容都是关于跟踪和信任建立，但是你需要获得信任的证据。”，他接着补充说：“文档只是交付的一部分，有时我们会说每一公斤管道的生产都伴随着10kg的文档的生成“。

说笑归说笑，质量评估的需求仍然在不断增加：“新的补充协议会出现，但旧的也很少采用。例如，在某些情况下，我们会做水电测试，然而，当我们要做超声波探伤时，水电测试又不是真的有必要，因为超声波探伤试验的结果已经包含了水力测试的结果。但水电测试仍是规范的一部分，一直都是，没有人愿意把它拿掉。“

为了帮助保持质量标准，Sandvik运行了一个涉及额外审计和员工培训

的内部评审体系。在世界各地的 13 个钢厂中，只有五家厂商生产的钢产品能应用于核工业：Sandviken, Scranton（美国宾夕法尼亚州），Arnprior（加拿大安大略省），Précitube（法国 Charost）和捷克共和国的 Chomutov。（Scranton 和 Arnprior 目前正在申请 HAF 604 的资格过程中）。

Sandvik 已在中国浙江省成立了一个新的工厂，目前正在生产无缝不锈钢管，主要针对非核级仪器仪表和热交换器。当被问及该公司是否会考虑设立核制造工厂时，Blazquez 回答说，“绝对会”，但并没有透露具体的时间；首先，工厂需要拥有足够多的核电经验。他说，在中国拥有自己的工厂是公司的目标：“拥有中国本地化的生产定会加强我们立足于中国核电市场的脚跟。”

来源：http://www.neimagazine.com

AP1000 依托项目首两台主泵从美国重新发运

美国东部时间 2013 年 8 月 14 日，AP1000 自主化依托项目三门 1 号核电机组首两台主泵从美国费城港码头发运，预计 10 月初到达上海港。

今年 1 月 13 日，AP1000 主泵制造商美国 EMD 公司在做某台主泵的产品试验后，拆检时发现叶轮入口叶片部分缺失。经调查确认，分包商在对该叶轮铸件叶片位置补焊时，未按照批准的程序文件进行，属于分包商在生产加工过程中重大管理失误。

国家核电技术公司高度重视，组织三门核电和海阳核电业主及国内制造企业的专家与美国 EMD 和西屋公司召开专题会议，对美方提交的根本原因分析报告进行了认真的审查。为杜绝任何可能隐患，我方决定将已运至三门的 4 台主泵运返 EMD 公司，更换叶轮和导叶，并对更换水力部件的主泵重新进行出厂试验。

AP1000 主泵是一种世界先进的立式、单极、离心式、整体封闭式屏蔽泵，作为 AP1000 核电机组最重要的核心设备之一，它取消了常规轴密封系统，简化了主泵仪控系统，消除了冷却剂泄漏隐患，制造精密度要求极高，大大提高了安全性和运行可靠性。

来源：http://www.china-nea.cn

核电工程公司设计院与来访美国赛瑞丹公司交流

2013 年 8 月 14 日，公司总经理助理、北京核工程研究设计院院长丁健，在第九会议室会见了前来拜访的美国 3M 公司赛瑞丹硼产品公司总经理 Dennis Manning 一行。公司副总工赵博、设计院科研设计管理部、堆工所、设备所相关人员参加了交流会。

丁健首先对 Dennis Manning 一行的来访表示欢迎，双方表达了友好的问候，在说明了本次会见的背景和需要讨论的问题后，Dennis Manning 介绍了 Ceradyne 公司的基本情况，并重点介绍了富集硼 10 在全球核电厂的应用情况和在三代核电的应用趋势、硼铝材料在核燃料运输存储的应用等。设计院对公司 ACP1000 三代核电技术进行了介绍，双方就感兴趣的话题展开了深入的讨论。双方均表示愿进一步加深了解、密切联系、增进合作。

来源：http://www.cnpe.cc

Azarga 将在香港成立私人铀和重稀土开发公司

本周位于香港基地的 Azarga 资源有限公司将继续开展一系列戏剧性的冲刺活动，因其在澳大利亚 Anatolia 能源公司的股份份额已超过 10%，Azarga 希望挖掘位于土耳其中部 Temrezli 矿藏中的 17.4 万磅八氧化三铀。在 Azarga 公布消息仅仅不到两周的时间后，8 月 16 日，Anatolia 在其公告中传来消息表示“矿业公司高管 Alexander Molyneux 将成立以香港为基地的私人铀和重稀土开发公司”并购买了 Powertech 铀公司 17.5%的股权与科罗拉多州北部美国百年铀矿项目的 60%的股权。目前还不清楚 Molyneux 对这个项目有什么看法，但和 Hansen/Taylor Ranch 项目相差不多。Hansen/Taylor Ranch 项目也在科罗拉多，由 Black Range 矿产公司所拥有，在一月 Azarga 成为其 19.9%的投资者。Azarga 在 Kyrgyzstan LLC 也拥有 UrAsia 80% 的股份。Azarga 还拥有 80%的股权，反过来又拥有 Kyzyl Ompul 公司在 Kyrgyzstan 的项目。

来源：http://www.hooyou.com

巴基斯坦恰希玛三号机组反应堆压力容器在核电石化事业部顺利通过验收

基斯坦恰希玛三号机组反应堆压力容器项目圆满完成了制造任务，经中国核工业集团公司、上海核工程研究设计院、中国中原对外工程有限公司等用户及专家的联合验收，各项技术指标均满足用户要求准许出产，并计划于本月 15 日装船起航。

验收仪式上，中国中原对外工程有限公司上海分公司副经理、验收组组长王勇向一重核电石化事业部颁发了验收证书。中国一重股份公司副总裁孙敏、核电石化事业部总裁许崇勇和中国核工业集团总经理助理李晓明、上海核工程设计院副院长夏志定、中国中原对外工程有限公司总经理杨朝东等领导出席验收仪式并分别致辞。各方均表示，项目的成功制造为后续的项目制造积累了宝贵的经验。今后各方将会更紧密、更全面、更长远地合作，为我国新一代核电站的建设与发展奠定坚实的基础，创造新的业绩。

来源：http://www.cfhi.com

核电站新闻

福清核电 1 号机组主泵电机吊装就位

8 月 2 日下午 18：15，福清核电第一台主泵电机顺利吊装就位于 1 号机组反应堆厂房主泵间。标志着福清核电在主泵安装的道路上迈出了关键一步，为 1 号机组能够顺利进行冷试奠定了坚实的基础。此次吊装从主泵电机装车，到主泵电机顺利就位于反应堆厂房主泵间，整个过程历时 9 个多小时。

福清核电 1 ～ 4 号机组主泵电机是由哈尔滨电气动力装备有限公司设计及制造，是我国第一台国产化主泵电机。

来源：http://www.china-nea.cn

方家山核电 1 号机组首台主泵水力部件顺利就位

8 月 2 日下午 16 时，方家山核电工程 1 号机组首台主泵水力部件顺利就位于主泵泵壳内，标志着方家山主泵项目现场安装工作正式启动，为后续 1 号机组冷试奠定了基础。

方家山主泵水力部件及电机等部件是以零部件形式到达现场，采用现场组装、分体安装形式完成整个主泵的安装。此次现场安装的首台主泵水力部件是 1 号机组 2 环路，经在 AC 厂房完成组装、装配、验收后再运输至 1 号反应堆厂房内进行吊装、安装等工作。

继水力部件就位后，8 月 3 日上午，首台主泵泵盖顺利就位，目前现场主泵后续安装工作正在有序进行中。

来源：http://www.cnnc.com.cn

辽宁红沿河核电站 1 号机组投入商运 设备国产化率高

东北首个核电站——辽宁红沿河核电站一期工程 1 号机组 6 日投入商业运行，该机组每天发电量达 2400 万千瓦时，可满足大连市 1/4 的电力需求。红沿河 1 号机组设备国产化率达到 75%，进一步提升了我国核电装备制造能力。

红沿河核电站由中国广核集团有限公司、中国电力投资集团公司、大连市建设投资集团有限公司按股比 45% ： 45% ： 10% 共同投资建设，采用的是中国广核集团自主设计的改进型压水堆技术 CPR1000。由一重集团大连基地制造的红沿河 1 号机组反应堆压力容器，是我国首台完全拥有自主知识产权、自主建造的百万千瓦级核反应堆压力容器。

来源：http://www.nea.gov.cn

反应容器精心放置到位　　来源：中核核工业集团公司

海南昌江核电 1 号机组压力容器吊装就位

8 月 5 日，在连续高温天气的考验下，现场各项工作有序进行，本体重 260 吨的海南昌江核电 1 号机组压力容器到场。8 月 10 日中午 12 点 30 分，昌江核电首台机组压力容器经过卸车、提升至 20 米平台、临时区存放、V 型翻转支座安装、压力容器翻转、吊至堆腔就位等主要工序，在现场各方的认真准备、积极沟通下，吊装顺利就位。

来源：http://www.cnnc.com.cn

宁德核电 2 号机组热试前装堆工作顺利完成

8 月 10 日 22 时，核反应堆公司宁德 EM2 队顺利完成了宁德核电 2 号机组 58 根主螺栓的拉伸工作。至此，宁德核电 2 号机组热试前装堆工作已顺利完成，为 2 号机组热试开始奠定了基础。

整体螺栓拉伸机体积大、设备结构复杂，加上有 58 颗主螺栓安装在整体螺栓拉伸机上，其吊装难度大、拉伸精度要求高，是宁德核电 2 号机组热试前准备工作中风险最高、施工难度最大的一项施工活动。为确保此次整体螺栓拉伸机吊装的顺利进行和主螺栓拉伸工作的顺利完成，宁德 EM2 队在项目部的大力支持下，精心组织、明确分工、立体监控，自 8 月 2 日 2 号机组堆内构件顺利装入压力容器开始，到 8 月 10 日最终拉伸完成，共历时 9 天。整个施工过程质量、安全、进度均得到有效控制，施工预案编制得当，各工种配合顺畅、各道工序衔接紧密。

来源：http://news.bjx.com.cn

山东将调整能源结构 安全发展核电为其中段之一

山东省政府日前出台的《2013-2020年大气污染防治规划》提出，到2020年，外输电占比将达到三成左右。为此，山东将积极调整能源结构，实施煤炭总量控制。力争到2020年，煤炭在一次能源中所占比重降到60%左右。其中一个重要手段是积极推进“外电入鲁”，加快推进“晋电送鲁”的各项工作。到2015年年底，力争实现“外电入鲁”1600万千瓦；到2020年，“外电入鲁”力争增加到3200万千瓦以上，外输电占比达到30%左右。

另一个重要手段是安全发展核电。2020年前，建成投产海阳核电一期工程第二台机组和荣成石岛湾20万千瓦高温气冷堆核电示范工程；争取开工建设海阳核电二期工程和荣成石岛湾2台CAP1400大型先进压水堆重大专项示范项目；加快推进华能荣成石岛湾2台AP1000核电机组工程前期工作；开展第三个核电站选址工作。到2020年，全省核电装机容量达到270万千瓦。

到2017年年底，淘汰小火电装机容量500万千瓦，淘汰青钢360万吨和莱钢350万吨炼铁产能。

来源：http://news.bjx.com.cn

宁德核电两项成果获实用新型专利证书

近日，由宁德核电主导设计研发的“超长杆铂电阻校准装置”、“安全壳泄漏率分析系统”通过国家知识产权局的实质性审查，获得实用新型专利证书。

近年来，宁德核电积极推进技术创新及新技术应用，从解决电站实际问题入手，围绕重点项目积极开展技术攻关。此两项国家发明专利的获得，对推动宁德核电开展科技创新以及后续申请高新技术企业具有积极作用。

来源：http://www.cgnpc.com.cn

方家山1号机组首台主泵电机就位

8月17日下午18时许，方家山核电1号机组首台主泵电机顺利就位于电机支承上，标志着方家山核电在主泵现场安装的道路上又迈出了关键的一步，为后续按期实现1号机组冷试目标奠定了坚实的基础。

方家山核电主泵电机通过哈电集团与奥地利安德里茨公司合作，完成尖端技术的引进、吸收，最终实现了国产化。此次现场安装的首台主泵电机是1号机组2环路，经在AC厂房完成组装、装配、验收后再运输至1号反应堆厂房内进行吊装、安装等工作。目前，现场各项主泵安装工作正在全面有序地进行。

来源：http://news.bjx.com.cn

福建宁德核电站2号机组启动热态功能试验

宁德8月19日电随着操纵员执行一回路注水操作，海峡西岸经济区首座核电站——福建宁德核电站2号机组热态功能试验近日正式启动。

宁德核电站相关负责人表示，2号机组热试的顺利开始将为后续装料、临界和并网等一系列机组带核活动奠定基础，推进2号机组明年上半年实现商业运行。据介绍，宁德核电站2号机组热试计划工期40天，主要将经历充水排气、一回路升温和升压多个试验台阶、一回路冷却降压、蒸汽发生器一次侧对二次侧密封性试验等阶段。

试验期间，机组将尽可能模拟实际运行时的条件和状态，包括模拟典型的温度、压力和流量状态，并在各状态下进行系统联调试验，及对预期运行事件的试验，保证核燃料装入后核电站所有设备安全运行。

位于宁德福鼎市太姥山镇备湾村的宁德核电站，项目规划总容量为6台百万千瓦级核电机组，一期工程建设4台单机容量为108.9万千瓦的机组。据测算，4台机组全部建成后，预计年发电量约300亿度，与同等规模的煤电站相比，相当于减少标煤消耗约980万吨，减少二氧化碳排放约2400万吨，减少二氧化硫排放约23万吨，减少氮氧化物排放约15万吨，相当于造林6.7万公顷，将为建设青山绿水的“美丽福建”发挥重要作用。

其中，一期工程1号机组已于今年4月15日正式投入商业运行。截至7月31日，1号机组整体运行状态稳定良好，已连续安全稳定运行2591小时，上网电量合计26.35亿千瓦时。对标WANO(世界核运营组织)2012年世界标杆值，9项WANO考核指标中，7项达先进值，1项达平均值。

来源：http://news.bjx.com.cn

7000余吨抗震钢筋直供阳江核电站

8月10日，集团承钢公司1700吨HRB400EΦ32mm抗震钢筋直供阳江核电站。据悉，这是今年以来第四次向其供货，目前累计达7000余吨。

对直供阳江核电站的订单，承钢高度重视，从坯料冶炼到产品轧制，组织相关技术人员全程跟踪，对影响产品质量的各环节进行拉网式检查，严格执行工艺要点及《核电用钢筋生产控制管理规定》，提高操作水平，提升产品的过程控制能力，确保核电专用材高标准、高质量完成。

据了解，阳江核电站位于粤西沿海的阳江市，是国家重点核电工程之一，共建设6台百万千瓦级核电机组，将于2017年全部完成建设。

来源：http://news.bjx.com.cn

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日本

日本首相安倍晋三领导的自民党于上个月赢得了大选，因此日本很有可能会出台新的法律来对国内的电力行业进行改革。日本政府在四月份对这种改革方案进行了审批，改革将分三步走，预计在 2015 年完全消除本地电力独裁现象以降低本国的电费，并计划最早于 2018 年废除定价限制。这份法案在 6 月份提交时没能通过审核，因为当时的上议院由反对党统治。现在自民党掌控了上议院，因此该法案可能在今年秋季召开的国会会议再次提交，其通过的几率会大大增加，但是最终还是取决于安倍在党内获得的支持率。与此同时，近期的改革将会该未来日本能源需求造成不确定性。由于日本采用了能源节省和高效利用的方案，因此电力销售一直处于疲软状态。尽管从总体来看日本经济呈现增长趋势，但是今年上半年日本前十名电力企业的销售额降了 3%。

中国

今年 8 月，中电控股有限公司（CLP）财务总监 Mark Takahashi 在接受采访时提到，CLP 于两年前以 70 亿人民币的价格收购了中广核阳江核电站 17% 的股份，不过这项交易迄今为止尚未获得相关部门的批示。造成批示进度缓慢的原因之一在于阳江核电站的 4 台 CPR-1000 机组现在正在建设中，并计划于今年年底商运。Takahashi 表示中广核非常欢迎与 CLP 合作，共同投资其在中国大陆南方的核电项目。不过他认为 CLP 需要考虑接下来的投资金额。Takahashi 称就香港核电市场而言，核电站的建立要取决于香港市的能源战略布局。他提到香港政府最近颁布了核电标杆价格，这将积极推动核能行业向前发展，为未来能源投资奠定了方向。

南韩

韩国核监管机构——核安全与安保委员会（NSSC）近期批准韩国水利与核电公司重启蔚珍（Hanul）核电站 4 号机组。2011 年 9 月，该机组进行停运维护和定期检查，期间发现蒸发器导热管存在腐蚀现象。电站运营商韩国水电与核电公司（KHNP）随后决定更换蒸发器。对于韩国水利与核电公司而言，这次重启无益于天赐良机，之前其因为受贿和安全隐患而被 NSSC 勒令停运两台机组（Shin Kori-2 和 Shin Wolsong-1），而其 Shin Kori-1 的重启计划和 Shin Wolsong-2 的启动日期也因此变得遥遥无期。三星证券分析师 SuJin Bum 称如果 Shin Kori-1 、2 和 Shin Wolsong-1 机组完成部件替换并在 10 月份恢复运行，则韩国水利与核电公司的母公司韩国电力（Kepco）在三季度的核电利用率将从二季度的 68% 提升到 78%。Bum 称，如果政府允许 10 月份提高电价，那么 Kepco 将会从中受益。

印度

印度能源部 8 月份批准将 Kundankulam 核电站的 100MW 电力分配给泰米尔纳德邦。位于该邦的双子核电站是由俄罗斯国家原子能公司承建，这次的电力分配无疑表明电站所在地获得了最大的收益。在此之前，这个装机总量达到 2000MW 的核电站已经将其 925MW 电力分配给了泰米尔纳德邦。余下的电力中，卡纳塔克邦分配了 442MW，喀拉拉邦 266MW，本地治里 67MW。印度原子能管制局上个月在一篇批评浪潮中批准了 1 号机组的临界申请，该机组 7 月 13 号达到了临界状态，一旦获得原子能管理局的满功率运行批准，该机组将还需要额外的 45 天的时间。全球反应堆供应商对印度核电项目持有浓厚兴趣，但是印度法律对于谁来承担核电事故造成的损失的各项规定使得印度核电吸引外商的计划止步不前。

美国

近期由美国能源部管辖的国家核安全管理局召开了一次公开会议，讨论关于核电技术出口的新规定。2011 年对第 810 条法律规定的修订文件引起了核电行业的广泛批评，这次美国能源部的提案综合考虑了之前的批评意见。Pillsbury 律师事务所的律师 Elina Teplinsky 说：“我们律师事务所所代理的部分客户的意见在这次提案中得到了解决，如 Ad Hoc 公司。”之前的法案规定美国向某些国家出口核电技术时必须获得政府的特别批准，这一规定引来了不少争议。而 2011 年的草案中罗列了一些可以直接进行技术出口的国家清单，这个清单是在两国已经存在核电合作协议的基础上制定的。这项规定给美国核电公司在员工雇佣方面造成了一定的影响，有些申请在美国核电公司工作的候选人可能已经获得了美国核管理委员会的许可，但是这些人的国籍并不在草案罗列的清单之中。能源局在这次举行的公开会议上宣称雇员只需要得到美国核管理委员会的许可即可，这一措施平息的不少人的忧虑。

英国

本周英国核退役管理局（NDA）向政府提交了通用－日立和坎杜能源建议书，并对其可信度做出了评价。这次建议书的主要内容是通用－日立和坎杜能源将会分别使用 PRISM 反应堆来处理储存在英国西坎布里亚郡的钚，这些钚是在过去几十年中使用的核燃料处理过程中分离的。与这份报告一起提交的还有一份进度报告，政府比较倾向用混合氧化物燃料替代钚，因此 NDA 对其相关贸易、技术和财政进行了评估。虽然 NDA 的报告并不能说明英国政府已经改变心意，但是最终拍案做决定的还是这些政治家。从某种意义上来讲，这份报告反映出这三种技术呈现三足鼎立状态。

台湾

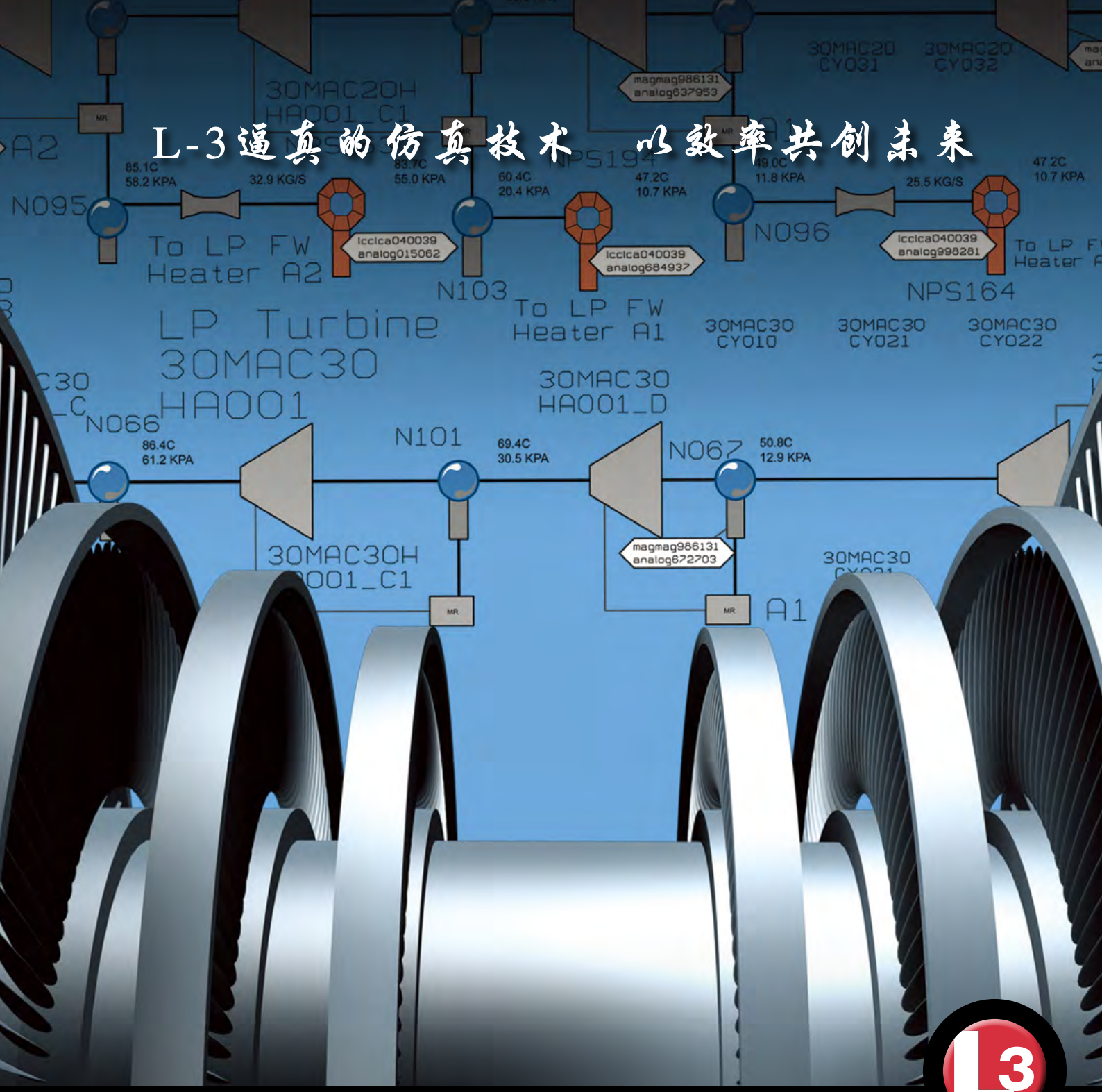
在 8 月 2 日举行的台湾国会议会上，台湾议员就是否对台湾龙湾 2 号核电站建设和开工一事举行民意投票而发生冲突。民进党反对派反对在台湾建设核电站，他们认为执政党国民党策划民意投票意在推动核电站启动。前民进党主席蔡英文在接受台湾时报采访时指出：“马英九政府的做法是欺骗百姓，损害了台湾的民主。”当时立法会议厅被民进党议员围的水泄不通，国民党立法者试图从人群中挤进会议厅时，两派议员发生摩擦，并打了起来。在争斗期间，国民党奋力争取民意投票事宜，预计投票会在半年之内进行。

法国

法国核电巨头公司法国电力公司（EDF）称 2013 年上半年法国核能电力产出平稳，同比下降 0.2%，英国下降 3%。因为具备水污染小，产能高的优势，新能源发电和水利发电电量有所攀升。净收入上升了 3.5%，高达 28 亿欧元（即 37 亿美元）。法国电力公司称其希望今年的法国核电站产量能达到 410—415 兆兆瓦时。EDF 的弗拉芒维尔核电站已经进入最后的环节，其中已经完成了 95% 的土木工程和 46% 的机电系统。其三号机组预计在 2016 年开始发电。EDF 说如果欣克利角核电站确实能够产生经济效益，那么他们也许会在今年年底进行投资。欣克利角核电站最近也遇到了一个麻烦，有传言说布鲁塞尔正试图减弱国家扶持的政策方针，这样伦敦就可以对 EDF 的项目进行支持了。

Nuclear Glossary 核电专业词汇

English	Chinese
base mat	垫板、基础层
base material test coupon	母体金属材料试样
base metal	母材、基础金属
base metal cracking	母材金属的裂纹
base package	基本部件
base plate	底板
base rock	岩石、基石
base slab	基础板、 垫板
base-load compressor	基本负荷压缩机
base-load plant	基本负荷电站
baseboard	踢脚板
baseline data	原始数据
basemat	基础底板
basement	地下室
baseplate	底板
basic allowable stress intensity (RCC-M)	基准容许应力强度
basic covering	碱性药皮
basic design	基准设计
basic flow diagram	流程图
basic function unit	基本功能元件
basic grid	基本网络
basic grid strap	基本格架条带
basicity index	碱度指标
basin (geographical)	盆地
basis control module	基本控制模件
basket	筐、笼
basket grip	筐、筐抓取机构
basketweave armor	编织铠装层
bastard file	粗齿锉
batch	份额、部件
batch distillation	不连续蒸馏法
batch number	批号
batch processing	分批处理
batch treatment	分批处理
batching	配料、定量
batching tank	配料箱
batter (of wall or embankment)	坡度（墙壁、路堤）
battery	蓄电池
battery bank	蓄电池组
batter charger	蓄电池充电机
battery pack	蓄电池组合
battery pliers	蓄电池钳
battery room	蓄电池间
bay	间距、跨度
bay window	窗洞
bayonet connector (quick disconnect)	卡口接头（快速拆卸）
bayonet coupling	插轩式接头
bead	卷边、球
bead blasting	喷丸
bead collecting system (shot peening)	微丸收集系统（喷丸）
bead collector	微丸收集器
bead generator	微丸发生器
beads	微丸
beam	梁
beam attenuation	射线束衰减
beam clamp	横梁夹板
beam compass	长脚圆规
beam index (ultrasonics)	波束指数（超声）
beam power	波束功率
bearing	轴承
bearing capacity (soils, etc)	承载能力（土壤）
bearing cartridge	轴承支架
bearing cover	轴承罩
bearing end cover	轴承端罩
bearing frame	轴承底座
bearing frame	轴承底座
bearing housing	轴承套
bearing pedestal	轴承架
bearing plate	燃料组件下管座支撑板
bearing point	支承点
bearing shaft sleeve	轴承衬套
bearing shell	轴承壳套
bearing shell half	半个轴承壳套
bearing shoe	半承底板
bearing sleeve	轴承衬套
bearing span	轴承跨距
bearing stress	支承应力
bearing support	轴承支架
bearing surface	支承面
bearings	轴承
bed	床、底板
bed v.	嵌入、封住
bedding	嵌入、封住
bedding mortar	封住灰浆
bedding tape	封住胶带
bedplate	座板、底板
bedrock	岩石、基石
beginning of cycle (BOC)	循环初期
beginning of life (BOL)	循环初期（燃料）
behavior	性能、机能
bell	铃
bell end (pipe)	锥形管头（大小头）
bell mouth (pipe)	锥形管头（大小头）
bell-mouth defect	喇叭口缺陷
bell-shaped end (pipe)	锥形管头
Belleville spring	贝莱维勒弹簧
Belleville washer	贝莱维勒垫圈
bellows seal	弹簧箱密封
bellows seal balve	弹簧箱密封阀
bellows-type manometer	弹簧箱压力计
belt	皮带
belt conveyor	传送带



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