



Institutional and Organizational Frames of Nuclear procurement in France

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NUCLEAR FRANCE

- Early 1970's French State chooses Westinghouse PWR
- 1973 Israeli-Arab war and oil crisis: Strong acceleration of the nuclear program
- State strategy of nuclear independence and security, economic development
- Centralized State, Grandes Ecoles, Technocrats ("X" high level engineers in industry, business, administration). Jaspers (1990)
- Today, France: 66 million inhabitants , 75% of its electricity from nuclear energy ; world's largest net exporter of electricity (gains over € 3bn per) ; export of reactors and fuel products and services ; waste management expertise.

FRANCE'S NUCLEAR PARK

- Total of 58 reactors for 19 NPPs. 2 or 4 reactors per Plant excepting Gravelines (6)

The nuclear park is distributed along classes:

- 34 reactors of 900 MWe (of which 6 are class CP0, 18 class CP1 and 10 class CP2; classes CP1 and CP2 are together referred to as CPY)
- 20 reactors of 1300 MWe (8 of class P4 and 12 of class P'4)
- 4 reactors of 1450 MWe (all class N4)
(Dismantled: GCR/UNGGs, SPX ; Construction: EPR)

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NPPS CLASSES AND PROCUREMENT

- Units from a same class represent a homogeneous set of technical characteristics and components
- Requirements and conformity controls can thus benefit from homogeneous procedures within a given class
- For providers, this means an important pool of components to satisfy
- In terms of safety, when a technical issue is spotted in one reactor, the rule is to apply automatically the technical repair or upgrade to all the other reactors of the same class, even if they appear faultless. The drawback is the relatively high economic cost of such an approach
- The cost of safety is to be put in relation to the cost of nuclear accident. Costs estimates between € 120bn and € 430bn according to accident severity scenario (Pascucci-Cahen & Momal, 2012). Additional costs: social disruption, and credibility of the nuclear option world wide

FRANCE'S NUCLEAR ACTORS: NATIONAL ORGANISMS

- Ministries: Environment-Energy, Education and Research, Defense, Foreign Affairs
- ASN (Nuclear Safety Authority), independent administrative authority, created by the 2006 Transparency Law
- National organisms (4) and Scholarly societies (2)
- Public establishments: IRSN (Radiological protection and Nuclear Safety), technical support to ASN ; CEA (Atomic Energy Commissariat), public research in energy, defense, life and health sciences ; ANDRA (National Radwaste Management Agency), mission given by the law of June 2006

FRANCE'S NUCLEAR ACTORS: NUCLEAR ENTERPRISES

- EDF, SOE, largest producer of electricity in the world
- AREVA, SOE, world leader of nuclear energy across the entire fuel cycle
- GDF SUEZ, 1/3 owned by the French State, Franco-Belgian foremost world producer of energy since merging with U.K. International Power in 2010
- Other major industrial groups: Alstom, Schneider Electric, Synodis
- Wide range of small industries (less than 50 employees), under the umbrella of CSFN (Strategic Council of the Nuclear Sector)

GOVERNANCE EDF AREVA, ASN 1/2

“ Nuclear: a State within the French State ”

- 2009, UAE nuclear bid: uncoordinated actors (Areva, with Suez and Total, then EDF) ; EPR: hi focus on safety, lo on costs, delays ; poor commercial outlook
- Top management differences: AREVA Ms Lauvergeon “Atomic Anne” (ENS Physics, Mines, Dem.), Mr Proglia (HEC, business, Rep.)
- 2010, France: Legalistic conflicts about AREVA fuel delivery and waste removal for EDF NPPs
- Government: “Stop competing, cooperate”

GOVERNANCE: EDF AREVA , ASN 2/2

- 2014, Government: puts Ph. Varin in Areva Board, as well as EDF's "*to ensure the strategic cohesion of the 2 companies and of the French nuclear industry*". Additional stated "compatibility" by naming of J.B Levy head of EDF: both X graduates, 1973 class (same as Alstom's President, and 2014 Economic Nobel Prize)
- ASN: The efficiency of the safety system rests in part upon the "wisdom" of the regulator, head of ASN (rather than upon a more precise and binding legal frame)
- Strengths and weaknesses of providing hi responsibility to (talented) individuals

LEGAL FRAME FOR TRANSPARENCY AND PREVENTION OF CORRUPTION 1/2

‘When sweeping the stairs, start by the top steps’

- Council Directive 2014/87/Euratom establishing a Community framework for the safety of nuclear installations
- France's Law 2006-686 on Nuclear Transparency and Safety addressing and reinforcing the management and organization
- France's Law 2013-907 for Transparency in Public Life Actors: full financial disclosure, control

LEGAL FRAME FOR TRANSPARENCY AND PREVENTION OF CORRUPTION 2/2

- European reform of public procurement rules, new directives 2014/24/EC and 2014/25/EC to exclude conflict of interest, fraudulent suppliers and practices
- Prevention of corruption in France: Central Service for Prevention of Corruption (SCPC) inter-ministerial service is overseen Minister of Justice, since 1993 (includes protection of whistle-blowers)
- OECD Anti-Bribery Convention for Foreign Public Officials in International Business Transactions, since 1999, signed by France

EDF ANTI-CORRUPTION STRATEGY AND CODE OF CONDUCT

‘EDF Group reinforces the building of awareness, training and control against the risks of fraud and corruption and in favor of respect for the rules of competition’ (2010)

1. Managers are responsible: integrated in their action plan and performance review ; practical guide distributed.
2. A program to build awareness of the risk of criminal sanction was launched throughout the Group in 2011. It responds to the hardening of anti-corruption laws in the United States and the United Kingdom.
3. A training program concerns all Group operatives.
4. Internal [communications] support and publications are mobilized.
5. Networks disseminate the culture of rule of law and pro-competition in the Group.
6. The Group exercises internal control on risks of fraud and corruption.

GDF SUEZ INTEGRITY FRAME OF REFERENCE

Integrity is 'an excellent tool for enhancing performance as well as a sense of pride in being part of a team, and for promoting cohesion'

- Detect areas and situations susceptible to fraud and corruption.
- Refer to the Group's existing management procedures, the internal monitoring program, the risk management approach and the audit program.
- Consult the appropriate experts, studies and tools provided by think tanks or initiatives of which the Group is a member.
- Deal with cases of fraud and corruption. Any instance of fraud uncovered must be dealt with and penalized if proven.
- Implement appropriate awareness and training.
- Apply widely-used evaluation benchmarks.

AREVA PROCUREMENT MANAGEMENT

- *“The topic of subcontracting continues to be monitored closely at every level of the group, e.g. greater consideration for safety, health, occupational safety and environment were incorporated into the Purchasing process in 2013”.*
- 2014 'make or buy' policy for each nuclear site. Internal prescriptive procedures were revised.
- Three classes of risk sensitivity , with suitable assessments and monitoring for each class of contract
- Service providers and contractors are directly involved in a 10-item analysis and sharing of operational feedback
- Group practices on contract supervision and traceability unified, training of 500 supervisory personnel. University engaged in observations of subcontracting activities.

AREVA 2013 ANNUAL REPORT ON SUBCONTRACTING

- The Top 10 AREVA suppliers listing is almost unchanged since the year 2010
- An average 70% of purchases for nuclear sites are procured from local enterprises
- Priority given to multi-year contracts to foster long-term supplier relationships (some 800 contracts for 3 years or more were signed in 2013)

AREVA CRITERIA USED TO ASSESS THE CAPACITY OF EXTERNAL CONTRACTORS

- Technical capacity: implementation capacity in terms of human resources, material and organization
- Economic capacity: financial stability, list of clients and activities
- Risk prevention and management: safety, radiation and environmental protection
- Quality control organization relying on ISO 9001 principles
- Safety culture
- Social engagement: adherence to AREVA values, diversity, training investment.

EDF GROUP PROCUREMENT MANAGEMENT 1/3

- The Production and Engineering Service (within EDF Group Purchasing Division) pilots procurement in the nuclear park. Main priority is to ensure quality and impartiality:
 - Competitive bidding
 - Equal treatment of suppliers
 - Transparency of calls for tender
 - Proportionality, which is adaptation of the process to the (more or less sensitive) nature of the purchase.

EDF GROUP PROCUREMENT MANAGEMENT 2/3

- The Purchasing Division identifies material traceability as a major tool for efficient procurement of quality
- The Division states that it is important to distinguish between commercial non-acceptance based records and the records used to establish acceptability
- Procurement operations are conducted within the rules of the European Directive 2004/17/EC governing competitive bidding, publicity, and pre-qualification systems.

EDF GROUP PROCUREMENT MANAGEMENT 3/3

- The governance of procurement at EDF Energy includes several special management groups, whose terms of reference are contained within the supply chain framework document:
 - Supply Chain Forum – A meeting chaired by the Supply Chain Director and comprising the Supply Chain Heads
 - Operational Supply Chain Forum – A meeting chaired by an appointee of the Supply Chain Director and comprising the governance practitioners and other co-opted stakeholders
 - Pre-qualification Forum – A meeting chaired by an appointee of the Supply Chain Director and comprising the Subject Matter Experts

GDF SUEZ PROCUREMENT MANAGEMENT 1/2

- Supply chain governance in adherence to the United Nations Global Compact principles: human rights, working conditions, the environment and anti-corruption)
- Supply chain policy seeks a 'process of continuous improvement both for industrial activities and for supplier relationships'
- Economic criteria of both price competitiveness and technical efficiency + sustainable growth perspective, environmental and corporate social + respect for the law and anti-corruption

GDF SUEZ PROCUREMENT MANAGEMENT 2/2

“Supplier relations must strictly adhere to ethical rules that define the reference framework applicable to all Group employees”

- Systematic competitive bidding of authorized (or qualified) suppliers for all purchases made in a competitive market
- Any engagement with a supplier must be a written agreement previously negotiated between the parties and signed by the authorized persons (contract or order)
- Management of suppliers' performance improvement (conformity and prompt supply of deliverables, responsiveness, greater competitiveness)

SUPERVISION BY THE NUCLEAR SAFETY AUTHORITY: CASE OF AREVA

In 2013, ASN performed 10 inspections on AREVA entities focused on subcontracting. Needs for improvement identified:

- Terms of reference should explicitly formulate the safety requirements that are part and parcel of the expression of supply needs.
- Prospective risk analysis documents and prevention plans framing the sub-contracted activities must be rigorously completed and applied.
- A formal monitoring plan must be developed and filled out all along the lifetime of the service.
- Acceptance of works or services delivery must be formalized in such a way that acceptability is correctly traced and that useful performance feedback is gained for future operations.

SUPERVISION BY THE NUCLEAR SAFETY AUTHORITY: CASE OF CEA

- Following 2012 inspection in which ASN found serious gaps in CEA's monitoring of AREVA NC, principal provider. ASN gave formal notice to the Atomic Energy and Alternative Energies Commissariat (CEA), as nuclear operator of the Plutonium Technology Plant and of the Chemical Purification Lab at the Cadarache site, to respect measures for the oversight of providers and for the management of skills linked to dismantling safety

NUCLEAR PROCUREMENT PROCESS: INCENTIVES FOR BUYERS

- Monetary incentives, such as bonuses for cost reduction, are not used in France. The United States case of the Millstone NPP, belonging to Northeast Utilities, is known in France: Low cost strategy chosen in the middle of the 1980's, weak safety level, vs. excellent financial performance and bonuses. In 1996, after several incidents and warnings, the US Nuclear Regulatory Commission forced the operator to stop the 3 reactors
- Group performance assessment is preferred, however personal incentives for continuous improvement are used by the operators in the form of extended in-service training (which is an element of qualification for career promotion). The 100,000 France-based EDF employees receive on average 40 hours of training per year.

NUCLEAR PROCUREMENT PROCESS: INCENTIVES FOR SUPPLIERS

- *Penalties.* Incentive takes the form of avoiding sanction (up to 10% of contract) by good performance (conformity, delays)
- *Job Assessment Records.* Itemized sheets record the evaluation given to each supplier for each and every provision of materials or service.
- *Positive integration of Supplier Performance Sheets.* Presently operators are studying the possibility to integrate overall Supplier Performance Sheets into the formal evaluation of bids and to reflect their performance criteria in the Best Overall Value assessment. A vendor's good record in this way would be positively incentivized because it formally improves the chances of winning future contracts. However, past performance sheets would disfavor new entrants, thereby reducing competition. The resolution of this dilemma is being studied now.

NUCLEAR PROCUREMENT PROCESS: BEST OVERALL VALUE

- Nuclear actors in France evaluate bids through technical and economic assessments, reported on a defined points system. It centers on identifying a best overall value bid (rather than a lowest bid)
- EDF public contracts valued over € 40m must be exposed to the prior opinion (*challenge*) of the *Commission des marchés d'Electricité de France*
- Contracts (excluding purchase of nuclear fuel) valued at € 100m or more, and specific amendment configurations, moreover are examined (*challenged*) by the Board of EDF

EXAMPLES OF CRITERIA TO IDENTIFY THE BEST OVERALL VALUE TENDER

Best overall value is determined along five main dimensions laid down by the tender rules. Assessment on these dimensions is weighted as 20% of the overall evaluation with a maximum contribution defined for each (€ price figures as the remaining 80% of the evaluation)

1. Working conditions – Improve living conditions for geographically displaced employees. Criterion: Value of indemnities granted for significant displacement, maximum contribution 5%
2. Human resource management – Prefer businesses that invest in skills. Criteria: seniority in trade qualification, percentage of employees aged under 30y, percentage of salary mass spent on training, maximum contribution 5%
3. Safety – Encourage best safety results. Criterion: Lost-time accident rate, maximum 3%
4. Technical performance – Prefer businesses where the quality of service has regularly given satisfaction. Criterion: Job Assessment Records established for the two years preceding the call, maximum contribution 5%
5. Innovations – Prefer enterprises that have shown their capacity to innovate. Criterion: Number of technical innovations implemented on industrial sites within the past 3 years, reproducible in the activities addressed by the lot, maximum contribution 2%

OVERARCHING PRINCIPLE OF CONFORMITY

Procurement is integrated into nuclear safety by all actors through the principle of conformity.

- As emphasized by ASN to AREVA, terms of reference – needs – must be expressed clearly in terms that also integrate the nuclear safety requirements
- Deliveries must satisfy needs or be rejected: the supplier incentive functions when the goods are accepted and the ‘clean bill of lading’ is submitted
- A clean bill generates in the French culture a sense of doing well at the first try, like receiving an A++
- Without that clean bill, sanctions are applied to the supplier: the delivery must be brought into perfect conformity at own cost, and potentially, late penalties must be paid
- Not only does the good supplier receive full payment for the job (no extra work, no late fees) but the contractor also becomes a supplier with good track record
- The EDF General Inspector (EDF, 2013) sternly calls on the purchaser to give full attention and full importance to the safety tool of Job Assessment Record, allowing all partners in the transaction to learn.

OVERARCHING PRINCIPLE OF CONTINUOUS IMPROVEMENT 1/2

- The French approach to nuclear safety and procurement can be summed up by the regulator's approach: the operator must 'prevent or limit in a satisfactory way the risks or inconveniences presented by the installations'
- This 'satisfactory' way is not strictly defined. The continuous improvement approach is not framed by a quantified statement of 'how safe is safe enough'
- What matters in France is the 'safety requirement rule set' (*référentiel de sûreté*). It takes the form of a compilation of safety requirements of all sorts (which will be used, inter alia, for procurement: norms and technical specifications, general rules of exploitation, best practices). These requirements come from ministerial decisions, ASN guidelines, and operators' analysis of operational feedback and detailed proposals analyzed in return by regulators. Each reactor class (900, 1300 and 1450 MW) has its own referential framework

OVERARCHING PRINCIPLE OF CONTINUOUS IMPROVEMENT 2/2

- This principle is justified because safety is never fully achieved, and that scientific and technical knowledge evolve. Operational incidents signal new issues that both operators and regulators should watch and understand
- Beyond the sole observance of conformity, the safety of nuclear installations therefore rests upon the search for continuous improvement, embracing organizational learning
- Similarly, safety and conformity constraints which apply to procurement are regularly updated as new data and knowledge are integrated (e.g. Korean tests). This should be seen as one of the factors of overall efficiency and quality of procurement.

SAFETY CULTURE AND NUCLEAR SAFETY REGULATION: F/USA COMPARISON 1/3

Safety culture: Strong emphasis on both sides: e.g. training to active questioning, thorough involvement, I/O Values surveys

Regulation: Differences

- On the American side: Quantified goals, common use of probabilistic studies, concern for limiting costs, search for efficiency (cost-benefit studies). The USA approach aims at settling a 'safe enough' safety level
- On the French side: General goals are clear but not detailed, regulatory prescriptions are few, technical dialogue (e.g. between operators and ASN) is preeminent, little reference to cost-benefit studies. The French approach aims at continuously improving safety

SAFETY CULTURE AND NUCLEAR SAFETY REGULATION: F/USA COMPARISON 2/3

Advice from both NRC and ASN are carefully listened to in the international nuclear community. But intrinsic shortcomings can be spotted in each approach.

- Briefly analyzed for the American side, the costs of establishing a heavy regulation appear very high, slowing down its evolution, delaying its implementation and diminishing its capacity to react fast. Some analysis suggests that too rigid a regulation was detrimental to the development of nuclear energy in the USA (Foasso, 2003).
- In contrast, the French regulatory establishment appears as a light-horseman: it moves fast when necessary and is not limited by heavy judiciary or procedural constraints, nor is it surrounded by multiple goals and norms. The principle of continuous improvement guides its action without being defined by a quantified goal

SAFETY CULTURE AND NUCLEAR SAFETY REGULATION: F/USA COMPARISON 3/3

The latent problems associated with the French approach can be anticipated as follows:

- The efficiency of the system rests in part upon the wisdom of the safety commissioners, and acceptance by the operators. Some more precise and binding legal frame might be necessary
- Cost-related pressures will rise. Two thirds of reactors in France will be 30 years old in 2015. Safety and refurbishment will cost more. Updating of safety standards will further increase these costs. The rate of electricity sold to French households is 'administered' by Government (i.e. it does not fully reflect costs), which means that EDF costs are not (fully) transposed to the electricity bill of households.
- The absence of quantified goals adds an unknown to the life span of French NPPs: 40, 50, 60 years ? This life span ought to be known to plan new installations (nuclear or other) to provide electricity on a continuous basis.
- Resources, even for safety, are not unlimited The principle of continuous safety without bounds can make safety appear unattainable; 'safe is never safe enough'.

FRENCH NUCLEAR SOES MANAGEMENT 1/2

Comparative research with 10 000 enterprises in 20 countries identified 3 basic managerial techniques Bloom et al. (2012):

- Targets: does the enterprise set its targets? Does it evaluate whether these targets are reached? Does it take corrective measures when necessary?
- Incentives: Are employees rewarded (with income) and promoted on the basis of their performance? Does the enterprise aim at attracting and keeping the highest-performing employees? Does it know how to manage its talented members?
- Monitoring: Does the enterprise continuously evaluate its performance? Does it use this information to improve operations?

FRENCH NUCLEAR SOEs

MANAGEMENT 2/3

- The monitoring of performance in French nuclear sector SOEs ranks high: see the principle of continuous improvement of safety. The focus on monitoring is part of an overall culture of learning and integration of new data and events
- Conversely, target setting by French SOEs in the nuclear sector is not the major principle in safety. In other managerial areas, basic targets are likely used as part of routine activities. It must be noted that State policy impedes upon some strategic targets, such as the price setting of electricity
- Individual incentive in terms of bonus or income is less developed, possibly limiting the capacity of enterprises to manage talents. Indirect incentive linked to training and career development is favored. It must be noted, for instance, that when UNGG/GCR or SPX NPPs were closed down, no one was fired: the entire workforce was re-trained, life employment is guaranteed by EDF

FRENCH NUCLEAR SOEs MANAGEMENT: EDF/NPPs 3/3

- Central top management of nuclear park is periodically renewed, and managerial structure changed
- Human-size entities: a structure per reactor (Manager knows the 1st name of each employee). Directors and Deputy-directors of NPPs are regularly renewed ; mobility (professional and geographical) encouraged for all personnel
- Central service provide in-service training programs to NPPs. France-based EDF employees receive on average 40 hours of training per year. EDF spends 6,4 % of total payroll on training (seven times the French legal minimum of 0.9 % of payroll)
- Moreover, NPPs have their own budget to engage training and consultation of their choice, e.g. O.B. and social scientists for context-specific research action on Safety Culture

CONCLUSIONS 1/3

- Principles, Values: Transparency, Prevention of corruption, Safety Culture, involvement of top management, continuous improvement
- Several Frames: International, Regional, National, Organizational, Individual ; Top down (e.g. start Transparency with actors of public life) + Bottom up (e.g. Safety culture and participation)
- Reporting of errors, incidents, fraud (in organizations and public); protection of Whistle blowers (risks, safety)
- Surveys and feedback: Individual and Organizational Values (e.g. loyalty, authority, relationships) and how they relate to effective attitudes of Safety culture (e.g. active questioning, participation)

CONCLUSIONS 2/3

- Treat well in-house personnel (training, professionalism) and subcontractors (e.g. NPPs temporary workers in “hot” areas)
- EDF and AREVA are SOEs and the State provided a strong overarching goal during French rapid nuclear build up. Assets: Centralization, elite schools, technocracy
- Nowadays, SOEs strategic management can appear problematic when 1) lack of harmony at the top and 2) complexity of open international competition.
Arbitrage: Nuclear Safety ; Time frame (L.T. investments ; Sellafield 2130 ; radwaste ...

CONCLUSIONS 3/3

- H. Blix (1986) “Somewhere... everywhere”:
Procurement improvement in each context enhances global nuclear safety, efficiency and acceptability
- Korea identified cover-up events in 2012 and engaged a policy direction for new regulatory activities, and KDI organized this seminar
- The next step could be: Large International conference on nuclear procurement and safety culture, to share learning at all levels from different contexts

THANK YOU FOR YOUR ATTENTION

