

# SUSTAINABLE SALE OF INTERNATIONAL MEGAPROJECTS: NUCLEAR POWER CASE-STUDY

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**Key words:** sustainable sale, organizational and financing model, international megaproject, multi-focus strategy, hybrid cooperation strategy, system dynamics.

“Iron law” of megaprojects is “over budget, over time, under benefits” [2]. The major scientific efforts to tackle the problem are focused on management skills. Fair number researchers point out that the roots of the megaprojects’ poor performance should be traced on the early stages of project preparation [1]. This mission is hampered through large uncertainty implying megaprojects’ planning given their technological and organizational complexity. Key decisions on megaprojects are considered to be made with bias of overoptimistic budget and unsatisfactory risks assessment.

Nonetheless the embedded reasons of megaprojects Iron law are still to be unlocked. One should note that megaprojects proliferation stemming from economies of scale [3] are often implemented as international endeavor with a megaproject exporting country on one side and a recipient country on another. The latter being often developing countries enjoys efficient gap overcome in technological and infrastructure development. Exact roles of partnering organizations can differ due to diverse megaproject organizational and financing models (e.g. turn-key, BOO, etc.) Two features are common for all of them: 1) there is always a megaproject’s vendor and buyer; 2) the deal should be economically feasible namely the investments pay back mode is to be settled.

Thus the preparatory stage of a megaproject is actually arranged as a sale process with fierce competition and ends up engraved in stone of legally binding multilayer set of interrelated documents (e.g. intergovernmental agreement, host-government agreement, EPC-contract, power purchase agreement, etc.) Vendor is to be talented enough to strike a deal between Scylla and Charybdis: the business case conditions should be attractive for the buyer and profitable for the vendor’s shareholders. Considering megaprojects long-lasting life-cycle (LC) and huge risk, undercutting is not a sustainable strategy, but a highway to Iron law. In view of all these features a nuclear power plant (NPP) project is a typical megaproject.

Peculiarity about megaproject marketing is that its competitiveness is assessed on three levels. For a NPP megaproject on a micro-level the technology maturity and commercial attractiveness matter. The first is compliance with buyer’s terms of references and national regulation both nuclear, industrial, environmental, and etc. The latter are evaluation of NPP LC (NPV, LCOE, IRR, etc.) NPP business case should match anticipated tariff and volume of electricity target market simulated with dynamic system. LC calculation is supported by requirements management and BIM systems.

On a meso-level the organization and financing model is to be developed in such a way that buyer’s demand is satisfied. Affordable financing sources imply coherent supply chain. Close ties of financial and technological partners compose hybrid cooperation strategy and establish a sustainable robust business case.

On a macro-level a bulk economic, political, environmental, technological, reputational multiplier effects of a megaproject are tested for their competitiveness. Megaproject parameters on micro, meso and macro-levels compose a ground for buyer’s decision which supplier to chose. These very parameters are to be crucial for vendor’s competitive multi-focus strategy. A local

optimal solutions on one level can sometimes not be achievable. Then deadlocks are escalated to a higher level and trade-offs take place in order to find an integral consensus.

Stakeholders' account-management contributes to megaproject sustainability throughout its LC. For NPP deals a strategy of integrated sale (IS) is elaborated which can encompass (besides NPP): NPP LC facilitation (fuel supply, O&M, waste treatment and decommissioning), financing arrangement, localization and technology transfer (customer's national industry involvement), capacity building and education, nuclear infrastructure (NI) development services. According to IAEA concept NI includes 19 elements which are to be mature for launching a national nuclear power program. For each NPP megaproject IS is contextualized with buyer's needs and buyer's country NI status (IS is theirs derivative). Sustainable IS strategy engage efforts on micro, meso and macro level.

Each component of IS should be viewed as a potential risk area to be cared for by a megaproject vendor. Creative IS makes it possible to foster sustainable relations with broad range of stakeholders attempting to avoid Black swans' step out from their shell eggs. Proactive IS constitutes novel social and institutional relations and is a key to fight against Iron law. Thus sustainable sale of megaproject are those which result in appropriate megaproject implementation for its stakeholders on micro, meso and macro-levels.

The presented concept of sustainable sale of international megaprojects is expanded relying on a data base of international NPP projects launched in 21st century both ongoing (in China, Finland, France, Turkey, UAE, UK, USA) and discontinued (in Bulgaria, Czech Republic).

**Conclusions.** Concept of sustainable sale of international megaproject is elaborated, including multi-focus, integrated sale and hybrid partnering strategy. Such multi-focus strategic set can be compared to multi-dimensional chess games, interconnected to each other and being played simultaneously.

## References

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