IAEA TECDOC
Alternative Contracting and Ownership Approaches for New Nuclear Power Plants

INPRO
Dialogue Forum
"Drivers and Impediments for Regional Cooperation on the Way to Sustainable Nuclear Energy Systems"
30 July – 3 August 2012

Don Kovacic
Integrated Nuclear Infrastructure Group (INIG)

IAEA
International Atomic Energy Agency

IAEA TECDOC - AC&O

- Initiated based on interests and needs of member states
- Resulting from challenges in financing, speed to market, human resource limitations, risk allocation, back-end concerns, others…
- Capture and communicate latest developments in this area and inform member states of possible options and the associated issues

Report Contents

- Review of classic contracting and ownership structures
- Motivations for alternative approaches
- Description of BOO(T) structures
- Description of regional approaches
- Case studies
  - UAE/ROK, Turkey/RF, Romania (Cernavoda 3&4), Krsko (Slovenia/Croatia), Lithuania (Baltic regional initiative), Finland (Olkiluoto)

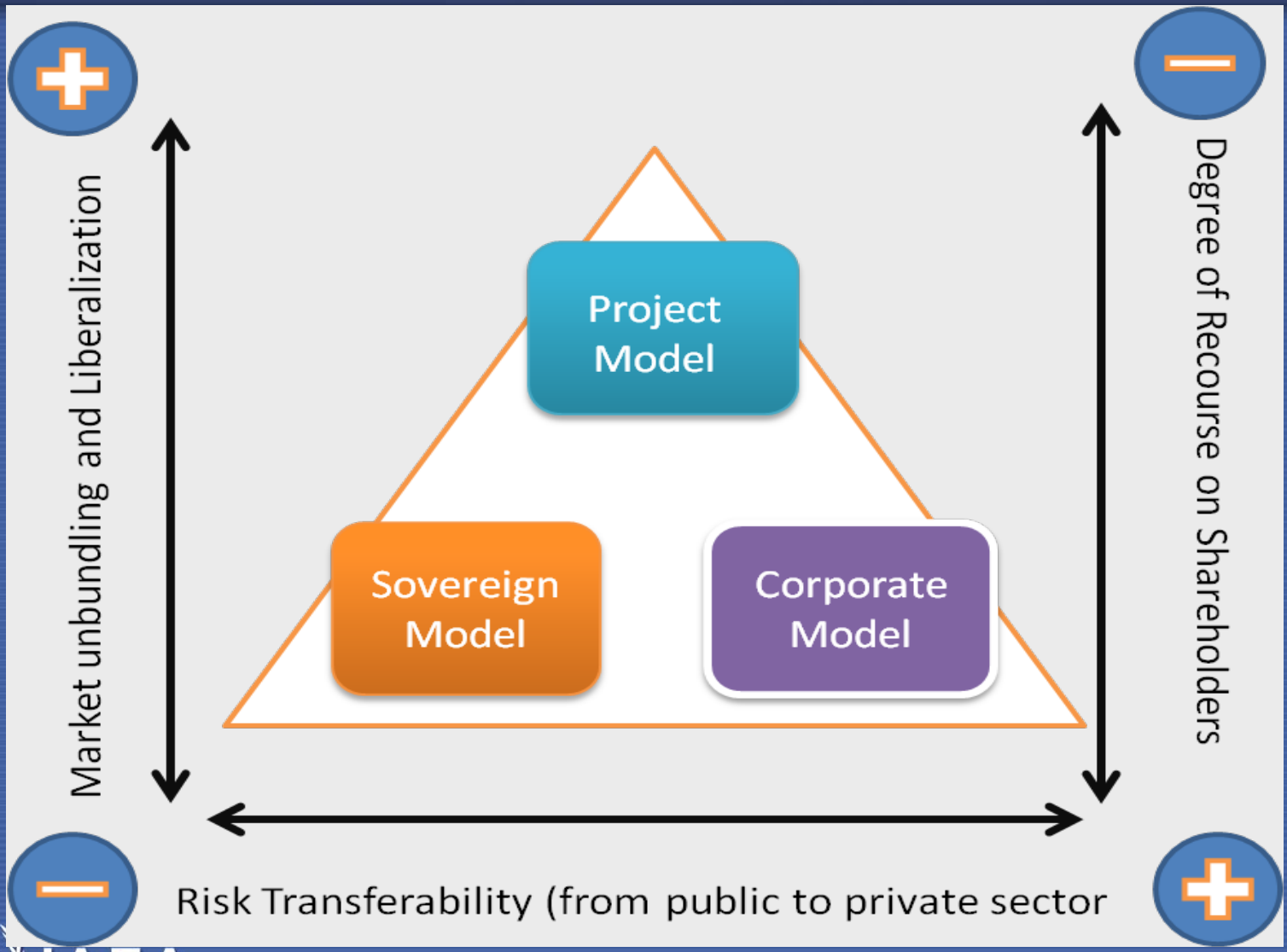
IAEA

Classical NPP Ownership Structures

- Sovereign based model
  - Assets owned or backed by HG
- Corporate based model
  - Public or privately owned entity
  - Investment through commercial debt and equity
- Project based model
  - Special project company created and maintains assets
  - Investment through commercial debt and equity
  - Has never been used for NPP
- Variations possible and each provides different risk allocation

IAEA

Contracting Models and Financing Techniques



Contracting Structures (Distinct from "ownership")

- Engineering, Procurement, and Construction (EPC) approach
  - Contract between owner and major engineering and construction firm - "Turnkey" project
- Split Package
  - Nuclear island, Turbine island, and BOP contracted separately
- Owner is Architect-Engineer
  - Owner enters into individual contracts and/or performs work themselves

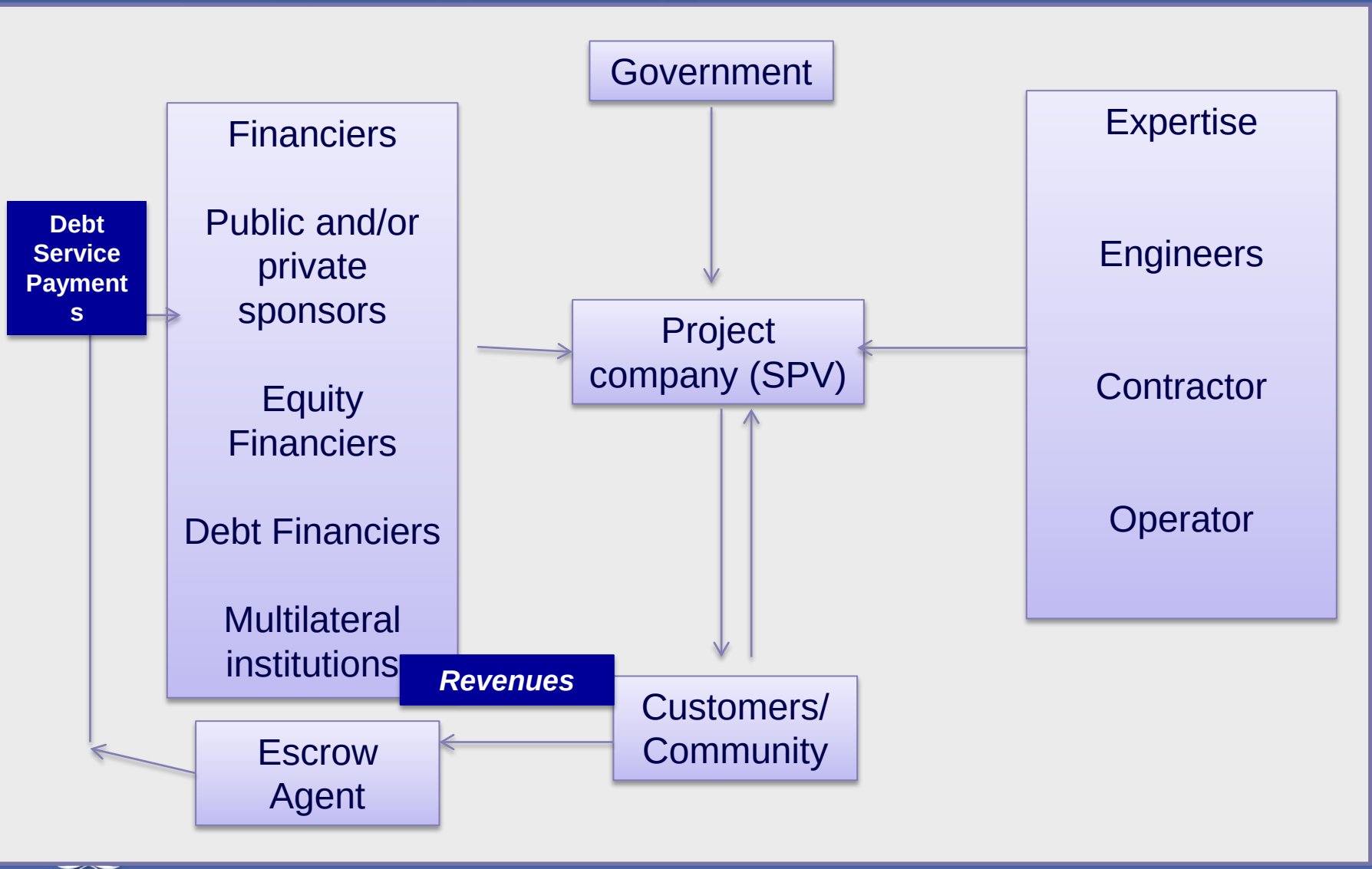
Motivation for Alternatives

- Leveraging financial resources
- Reduce level of technical capacity required
- Reduce human resources required
- Reduce timeframe for NPP development
- Reduce level of infrastructure development
- Limited market and/or grid capacity
- External support for project integration
- Risk transfer

Build-Own-Operate-(Transfer)

- Host government (HG) decides that a non-government entity (Developer) will build NPP through project company (SPV)
- Public-private partnership
- Developer is responsible for bringing together project development capabilities such as:
  - Technology;
  - Engineering, Procurement, and Construction;
  - Fuel Supply;
  - Operations; and Financing.

Typical structure/organization of a public-private partnership through SPV



BOO(T) successfully used in other industries/sectors

Energy: power plants

Transport

Telecommunications and IT

Water/sewerage/drainage

Real Estate

Tourism projects

Education

Health facilities

IAEA

Built Own Operate and Transfer

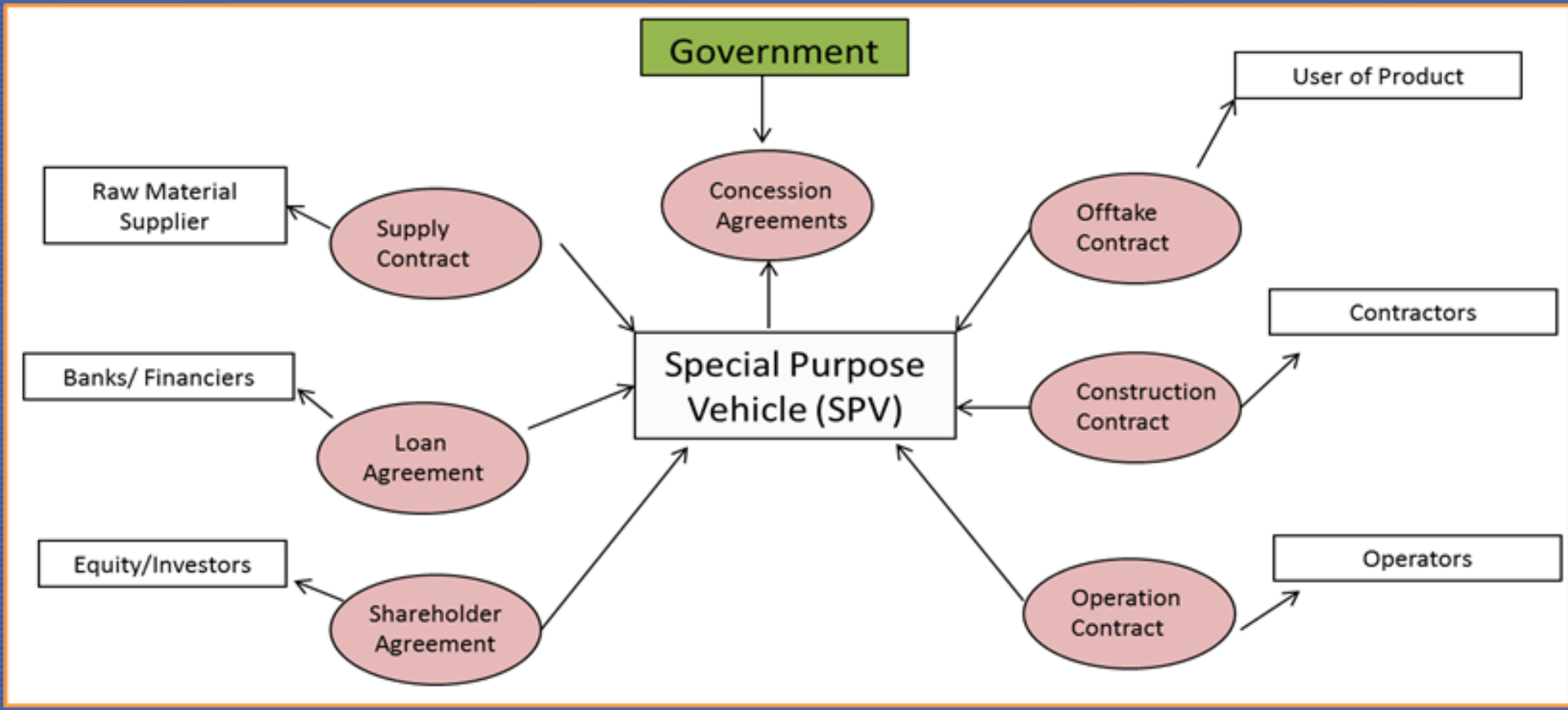
Suez Canal was the first BOT project: November 17, 1869, where the ruler of Egypt granted a 99-year concession contract to International Company*

* Nationalised in 1956

IAEA

Built Own Operate and Transfer Contractual/Functional Structure

A BOO/T mechanism is a complex structure with *multiple, inter-dependent agreements among various participants – (simplified version)*



Drivers for BOO(T) Structures - HG

- Limited HG financial resources/credit rating
- Leveraging of limited HG human resources and technical expertise
- Transfer of risk to complete project to developer
- Speed to market – turning to a developer with greater capabilities and capacities
- Solution to RW management and HLW disposition
- Solution to decommissioning issues

Drivers for BOO(T) Structures - Developer

- Project profit
- Market entry
- Long term electricity “off-take” agreements that is supported by the HG can provide greater confidence for the overall project (i.e., reduce risk of default by HG).
- Greater control of project and therefore lowers construction risks
- Transfer responsibility for decommissioning if (T)-Transfer

HG Core Competencies (i.e., Infrastructure)

Certain functions can only be provided by the host government:

- National Position/Commitment/ Site Selection
- Licensing/ Legal and Regulatory Framework
- International Treaty Commitments, Conventions, and Bilateral Agreements
- Audit Regime
- Electrical Grid Management
- Safety, Security, Safeguards
- Spent Fuel and Nuclear Waste
- Decommissioning

IAEA

Challenges to BOO(T)

- Transfer analysis – when to transfer project to obtain maximum ROI for Developer
- Long Investment recovery period
- Assessing risks over long period of time – force majeure, political stability, regulatory, currency fluctuations
- Transfer of NPP – HG's ability to take transfer and all issues must be clearly established in contract

Challenges to BOO(T)

- Rad Waste and HLW/Spent fuel - clear regulations and contractual agreement must be in place.
- Problems with transfer of HLW for permanent disposal
- Decommissioning – HG must have plan for final disposition of the asset and all project participants, including financing entities, must understand plan
- Foreign ownership issues
- Sustainability of project if conditions change

Challenges to BOO(T)

HG must maintain certain responsibilities

- Licensing and competent regulator
- Shared responsibility for Safety? – Safety is normally the responsibility of operator
- Safeguards? – International safeguards as well as domestic safeguards (i.e., nuclear material accounting and control) will require coordination between HG and developer.
- Security? – Operator retains responsibility for physical asset and HG for outside the fence?
- Export controls? - HG must be party to bi-lateral treaties for export control and develop mechanisms to maintain control

IAEA

Regional Approaches

- Involves participation of at least two countries in close proximity
- Government to government agreement to develop and share asset
- One country must be the host of the NPP
- Varying degrees of involvement of non HG countries from equity only and energy off-take to full participation

Regional Approaches

Motivations:

- Aggregation – Sharing costs, risks, human resources, infrastructure, and knowledge
- Security of energy supply
- Grid constraints
- Site limitations
- Sharing environmental credits
- Economic development

Challenges to regional approaches

- Leadership and decision making much more complex with multiple sovereign nations involved
- Increased responsibility of HG – Licensing and Regulatory control, security, safeguards, nuclear liability
- Sharing of responsibilities for nuclear waste and decommissioning
- Lack of true energy independence of non-HG
- Complex contracting structures required

Akkuyu NPP Project General Overview

Akkuyu is the first NPP project configured on BOO principles

- Project value – $ 20 bn.
- Construction period – 2011-2021
- Reactor type –VVER
- Total capacity – 4 800 MW (4 units)

Site – Akkuyu, province Mersin, Turkey

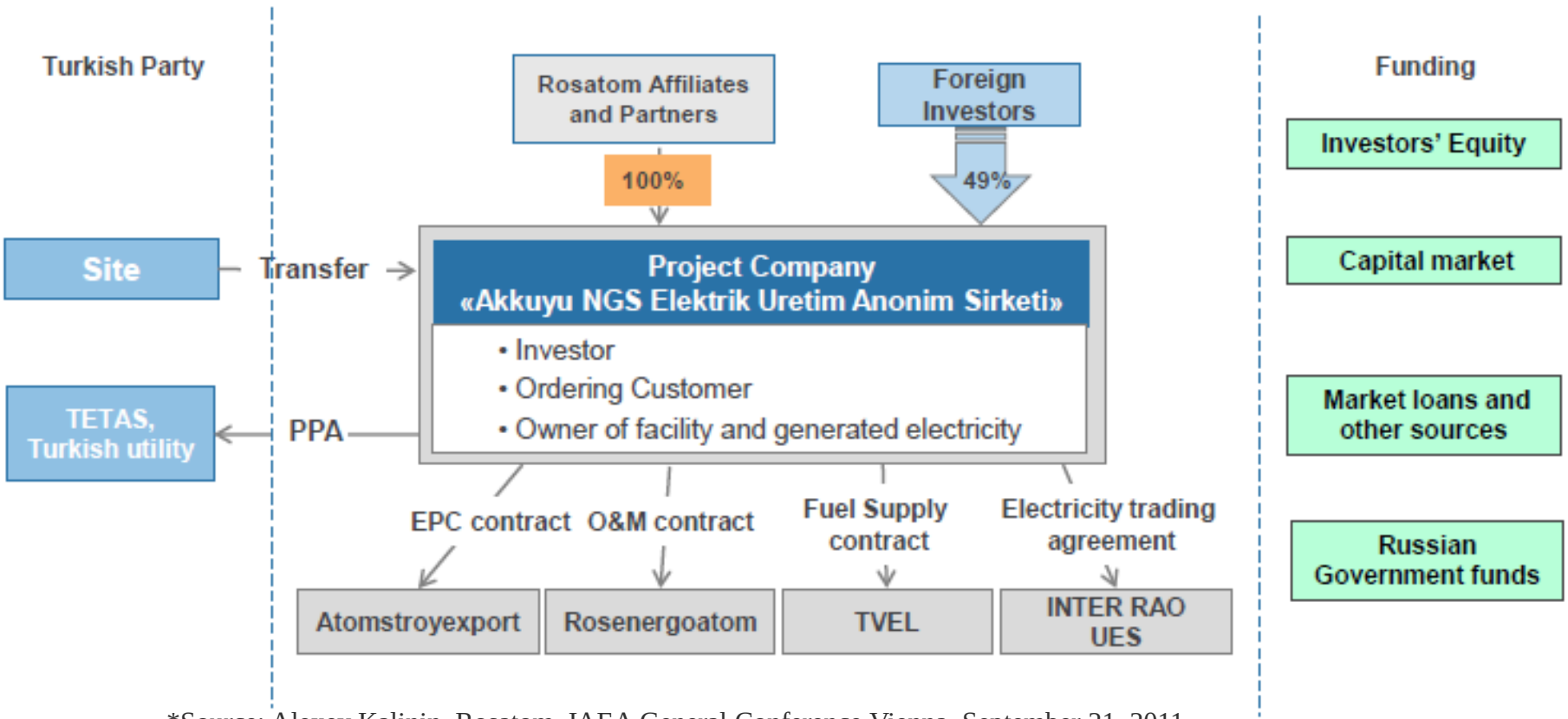
Specific customer's requirements for the vendor

- Build, own and operate the NPP (BOO)
- Train local personnel
- Maximize local content
- Support local legislation development
- Cooperate in licensing and nuclear safety
- Ensure lifetime fuel supply
- Upgrade, maintain and decommission NPP
- Ensure spent fuel and nuclear waste treatment
- Implement social responsibility programs

*Source: Alexey Kalinin, Rosatom, IAEA General Conference Vienna September 21, 2011

Project Implementation Scheme

- Project company (PC) is tailor-made JSC incorporated in Turkey
- Initially Rosatom affiliates own 100% stake of the PC and retains the majority stake during the whole lifetime of the Project (51%-100%)
- International investors are welcome to join the project at any stage of its implementation and can own up to 49% stake



*Source: Alexey Kalinin, Rosatom, IAEA General Conference Vienna September 21, 2011

Infrastructure is a Joint Responsibility

Scope of supply

- NPP Design, construction management/supervision
- Equipment
- Fuel
- NPP operation & maintenance
- Electricity trading
- Spent nuclear fuel and nuclear waste treatment

Joint responsibility

- Nuclear regulation and legislation development
- Public acceptance

- Training of skilled personnel

Turkish responsibility

- Site infrastructure
- Grid connections
- Physical protection
- Civil Construction and installation

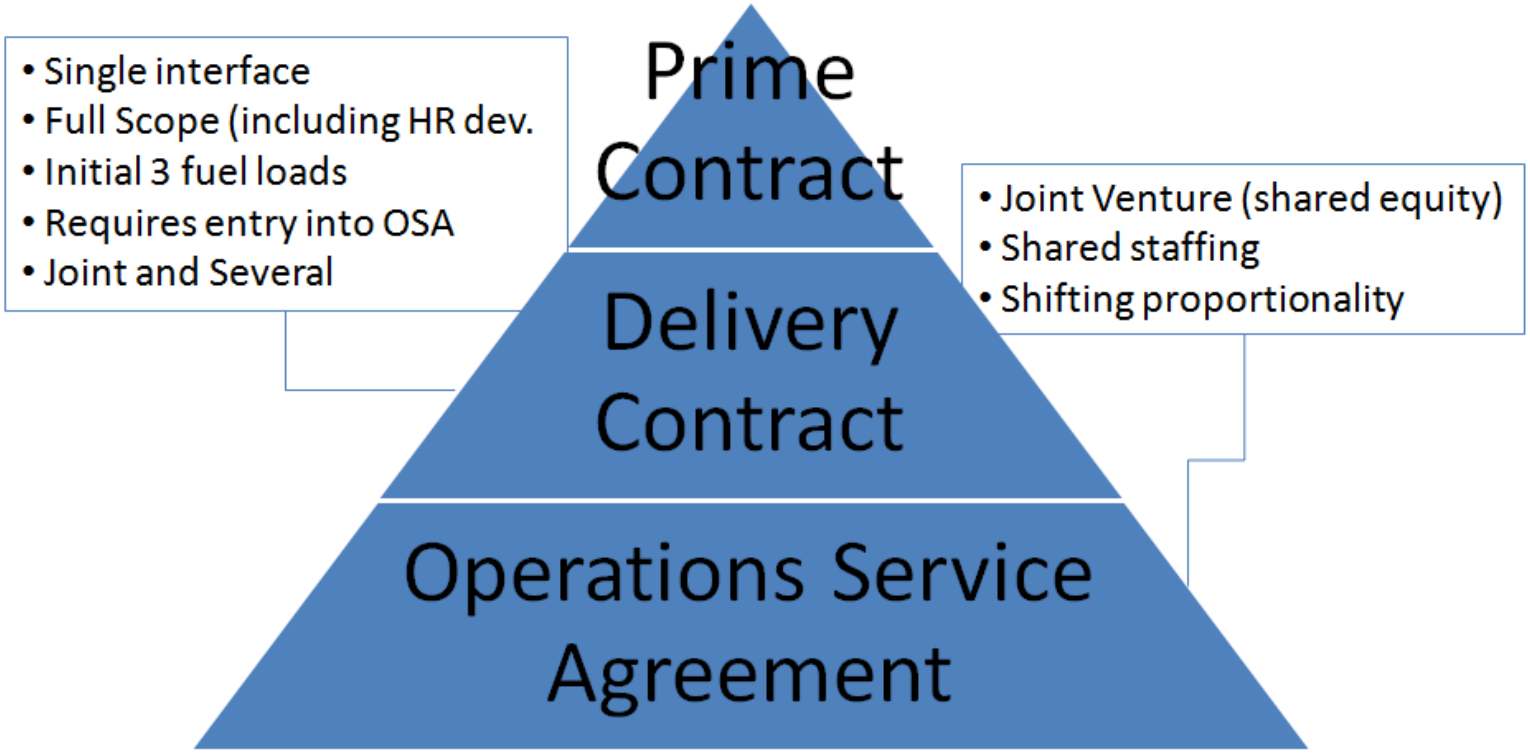
Russian responsibility

Turkish responsibility

*Source: Alexey Kalinin, Rosatom, IAEA General Conference Vienna September 21, 2011

UAE/ROK - Joint Venture BOO*

Award and Contract Structure



…PC provided access to 1,000's of years of exp.

*Source: David Scott, Vienna October 13, 2010

Principal scheme of Visaginas NPP project

Lithuanian Government

Energy sector and nuclear legislation

- *Regulatory regime*
- *Consenting regime / licenses*
- *Decommissioning regime*

Policy setting

- *Considers and approves investment incentives*
- *Interacts with European Commission including any State Aid approvals*
- *Tax and Customs regime*

- ***Selects successful Strategic Investor (via Concession Commission)***
- ***Awards Concession***
- ***Political support***

Strategic Investor

- *Contributes capital*
- *Receives production offtake*
- *Has relevant expertise and capability to lead construction and project management*
  - *Planning & construction oversight*
  - *Can provide technology as part of tender*
- *Can be awarded the EPC, O&M contracts*

VAE
(Lithuania Investor)

Owns VAE

*Contributes capital **and** in kind: site, infrastructure etc*

Receives production offtake

Latvian Government

Owns

Latvian utility

Contributes capital

Receives production offtake

Estonian Government

Owns

Estonian utility

Contributes capital

Receives production offtake

Polish Government

Owns majority / Controls

Polish utility

Contributes capital

Receives production offtake

PROJECT COMPANY

Develops, builds, runs and decommissions the NPP

Lithuanian Nuclear Regulator (VATESI)

Regulation and licensing

Required contract

Krško NPP-Regional Example

- 1970 Agreement between the Socialist Republic of Croatia and Socialist Republic of Slovenia, - Foundation of the NPP Krško. Joint company formed to operate NPP
- Construction started 1975
- October 1981 NPP Krsko synchronized to grid (commercial operation from January 1983)
- 1983-1992: First Decade of Commercial Operation
- 1992 Dissolution of Yugolslavia
- 1993-2002: Decade of Disputes
- 2001 New Agreement
- Today: Successful Operation of NPP Krsko with new decommissioning program

IAEA

1993-2002: Decade of Disputes

Differences in the common understanding of Governing Agreements produced numerous disputes between the Parties

Main disputable issues for HEP and Croatia:

- Reduced rights for employment of Croatian workers
- Participation of the Croatian managers in the Krško NPP senior level management
- HEP's participation in the SG replacement project
- Application of different accounting standards for HEP and for Slovenian stake
- Slovenian insistence on HEP's contribution into Slovenian Decommissioning Fund

IAEA

1993-2002: Decade of Disputes

Main disputable issues for Slovenia:

- HEP's failure to pay for the electricity it received from the Krško NPP
- HEP's refusal to contribute to the Slovenian Decommissioning Fund

The Governing Agreements did not expressly deal with financing of decommissioning at the end of the Krško NPP useful life (2023)

- HEP's refusal to approve all projects from the modernization programme
- Amount of pooled depreciation, ...

IAEA

Disputes culminated on July 30, 1998

- The Government of Slovenia disconnected transmission lines from the Krško NPP to Croatia and terminated all deliveries of electricity from Krško NPP to HEP (CROATIA)
- Negotiations were carried out from August 1998 to July 2001
- The new Agreement Between the Government of the Republic of Croatia and the Government of the Republic of Slovenia was finally signed on December 19, 2001
- New Agreement entered into force on March 11, 2003
- The resumption of electricity deliveries from the Krško NPP occurred on April 19, 2003, almost 5 years after 1998's cut off.

IAEA

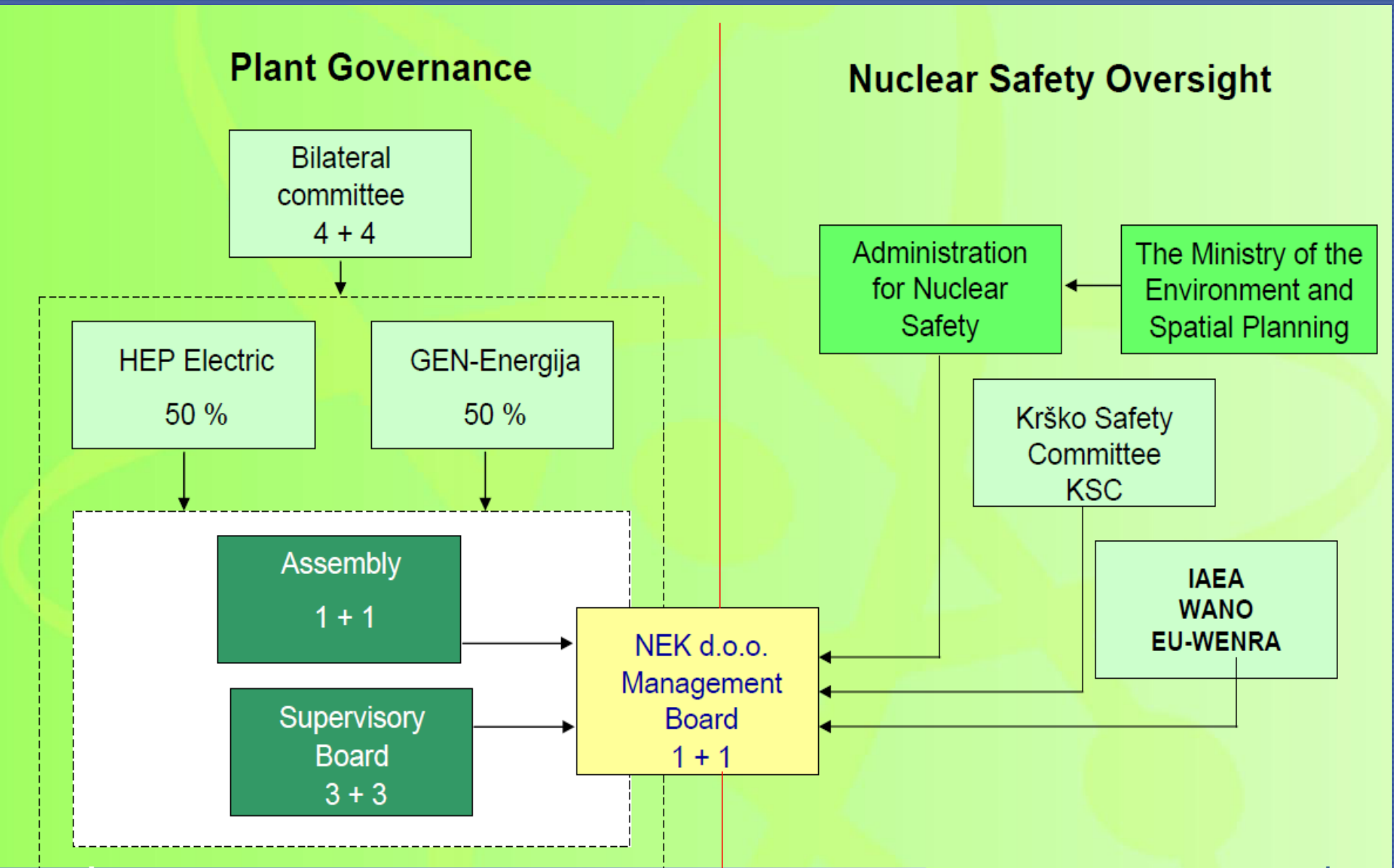
2001 New Agreement Most significant features

Governance of the Krško NPP

- HEP and ELES GEN designated as Legal Successors to the Original Investors
- The designated "Company bodies" would be the Shareholders' Assembly, the Supervisory Board, and the Management Board, "all of which are composed on a parity basis.
- 50:50 Rights to Total Power Output of the Krško NPP
  The Krško NPP is required to deliver electricity produced at the Plant to the Shareholders in equal proportions.

IAEA

2001 Agreement - Management



2001 New Agreement Most significant features

Ownership model

- The NPP Krško is limited liability company based on the capital relationship of Croatian and Slovenian investors
- The company operates based on the principle of covering of all expenses – in principle does not produce either losses or profits as a result of its operation

2001 New Agreement Most significant features

Decommissioning program

- The main purpose of the joint program was to estimate the expenses of the future decommissioning, radioactive waste and spent fuel management for Krško NPP, as the basis for establishment and financing of decommissioning fund in Croatia, and for correction of the annual payments into the existing decommissioning fund in Slovenia.

IAEA

Some Conclusions

- Alternative approaches (BOOT) not yet proven in nuclear industry
- No evidence yet that the infrastructure requirements will be reduced
- Certain responsibilities will always remain with the HG
- Main objective is the efficient allocation of risks- risks allocated to the party most able to accept the risk

Thank you...

Don Kovacic

Integrated Nuclear Infrastructure Group

International Atomic Energy Agency

d.kovacic@iaea.org

+43-1-2600-22504

www.iaea.org/NuclearPower/Infrastructure

IAEA