

Where does the money come from? Financing challenges for a MOG

Mid-term conference, Amsterdam, 06-06-2018

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- Conclusion





Financing challenges



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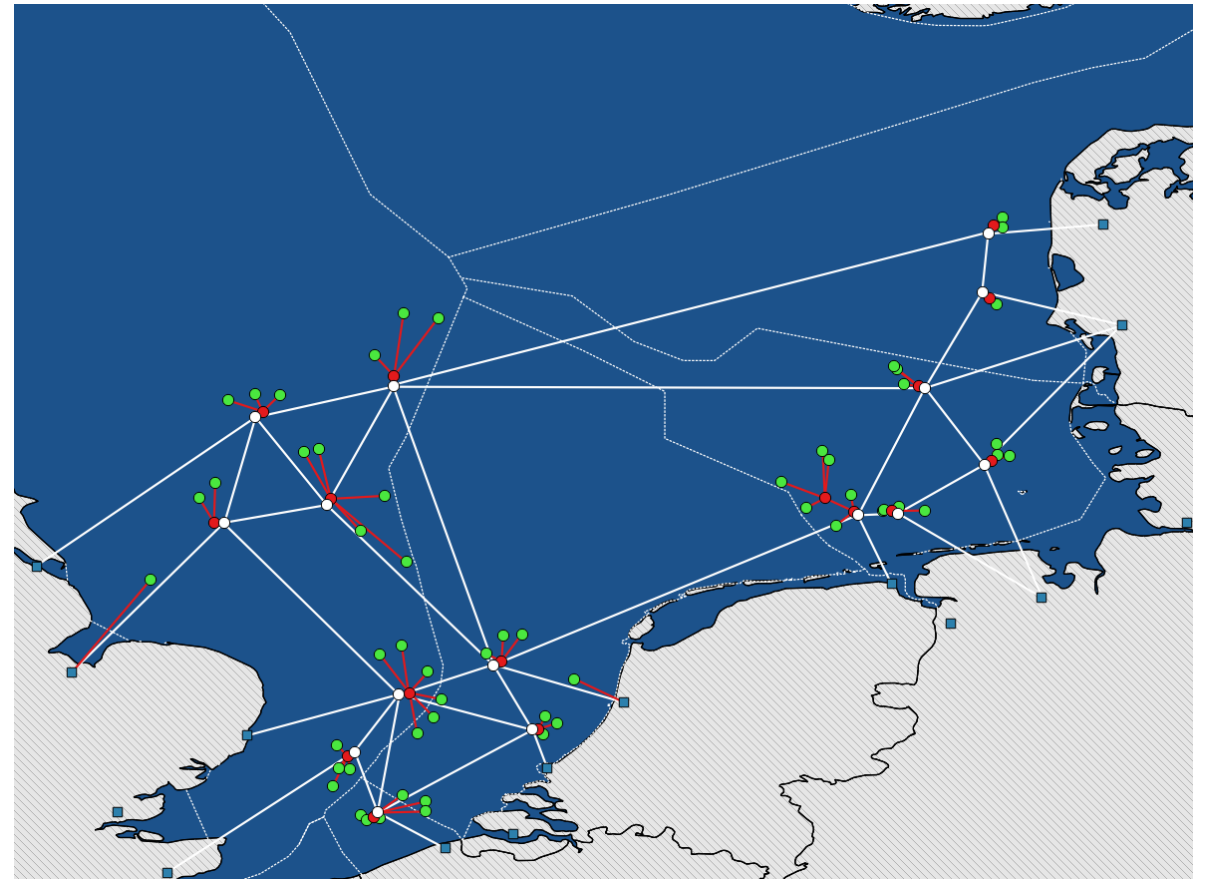
Financing challenges & private investors' concerns

- Huge investment volume
 - EUR 100 billion by 2030 for offshore grid in the North Sea (ENTSO-E, 2014)
- Public & private capital is needed.
- Cannot be covered only by debt side
 - TSO balance sheet constraints
- Significant equity is needed but
 - state-owned TSOs face government's budget constraints
 - legal restrictions on access to private equity
- Private investors' concerns:
 - TSO-monopoly
 - TSO legal ownership restrictions
 - regulatory clarity/ retroactive actions/ regulatory consistency
 - complexity due to different national regulatory frameworks
 - lack of central pan-European grid planning and structure
- If interest rates increase:
 - greater competition with alternative investments in the market
 - danger of limited financing potential for the sector



Important: North Sea MOG vs coupling of grid areas

- The North Sea MOG is an integrated grid, not a coupling of national TSO grids



European decentralized wind power hubs Concept, D12.1 (WP12), p.26

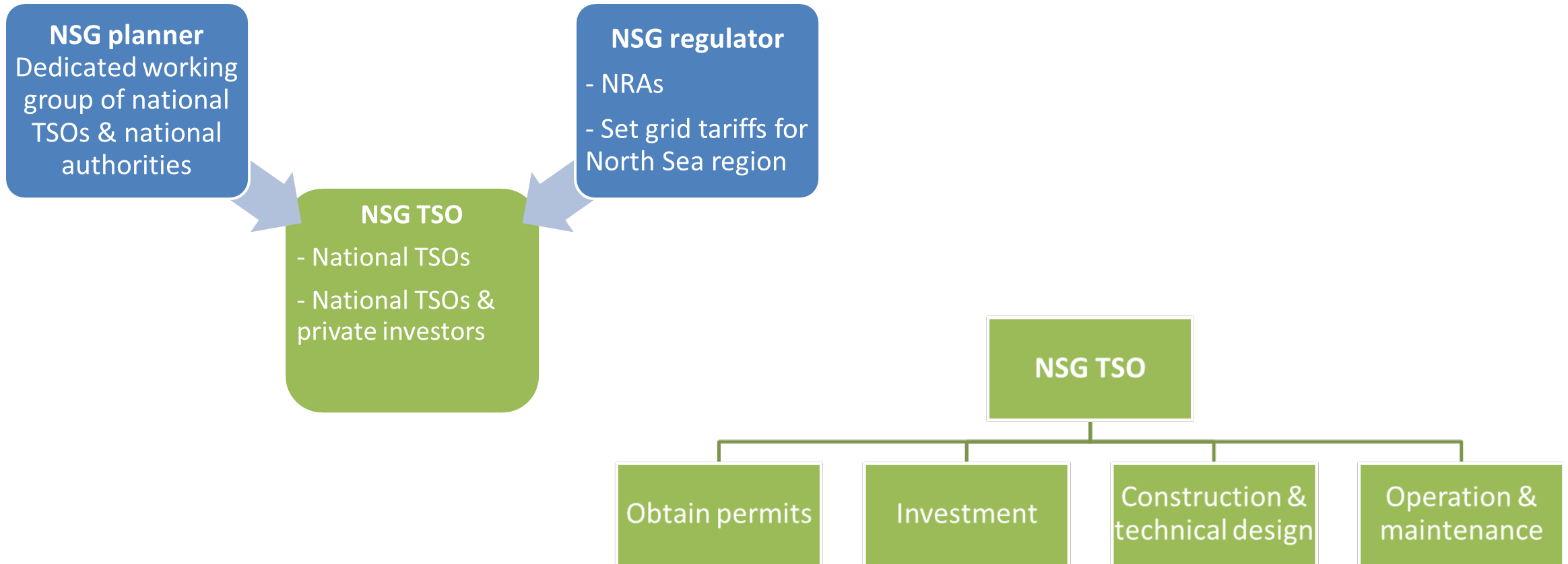


Possible investment models for a MOG in the North Sea



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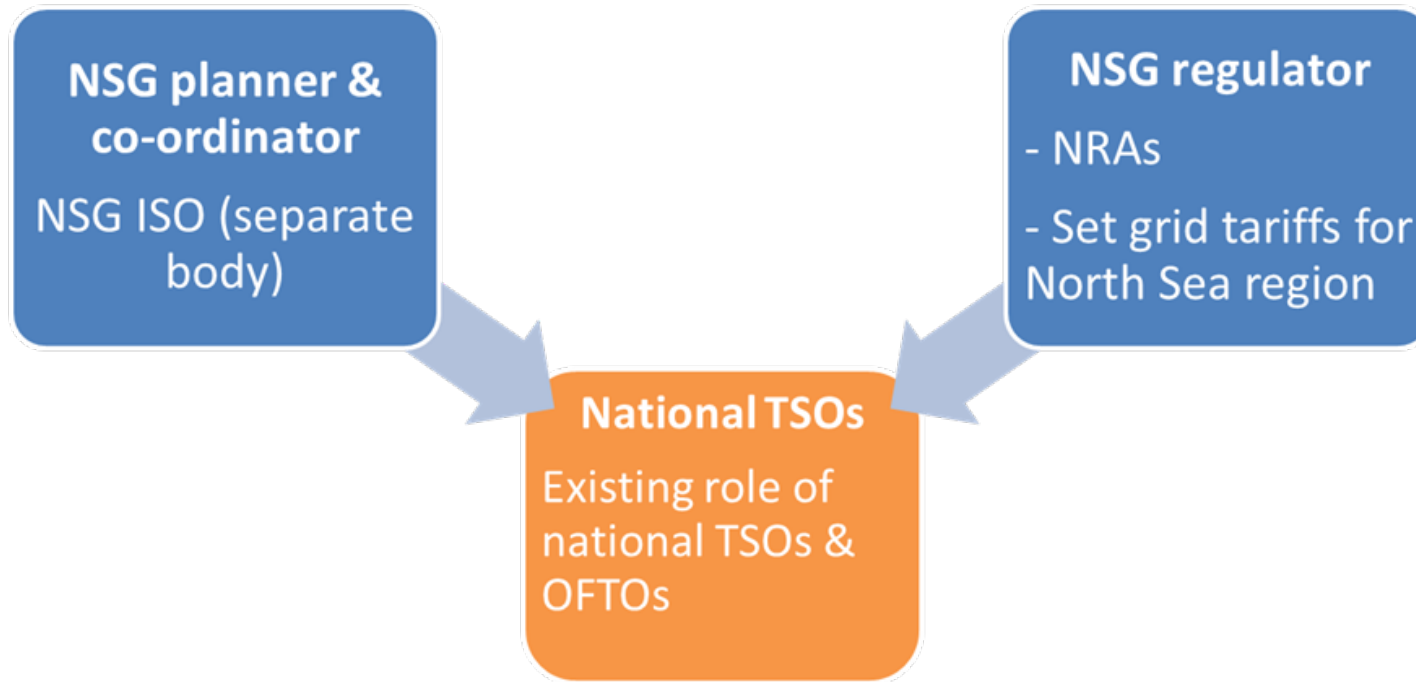
Model 1: North Sea Grid (NSG) TSO



Model 1: North Sea Grid (NSG) TSO – Evaluation

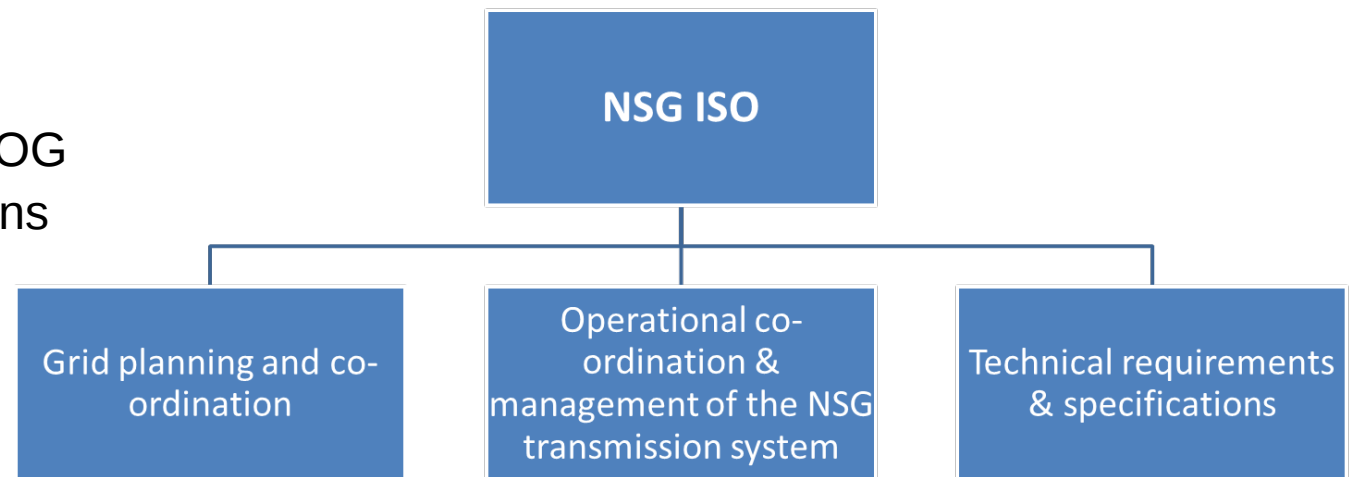
- One entity responsible for construction and operation of the MOG
 - less interfaces
 - less effort for operational grid co-ordination
 - achieve faster a common approach to the development of a MOG
 - If NSG TSO is an enterprise with a reasonable RoE and allows private shareholders
 - attractive to private investors
 - facilitate equity provision
- Challenges:
 - TSO legal ownership restrictions
 - Exclusion of the current TSOs' role
 - Great effort for development of a uniform legal and regulatory framework and tariff structure
- Set up a NSG regulator responsible for setting a grid tariff system for the MOG

Model 2: National TSOs



Definition: NSG ISO (Independent System Operator)

- It is an integrated grid, not a coupling of national TSO grids
- Set up a NSG ISO: national TSOs and/or national authorities
- NSG ISO responsible for:
 - Grid planning
 - Operational co-ordination
 - Efficient management of the entire MOG
 - Technical requirements & specifications



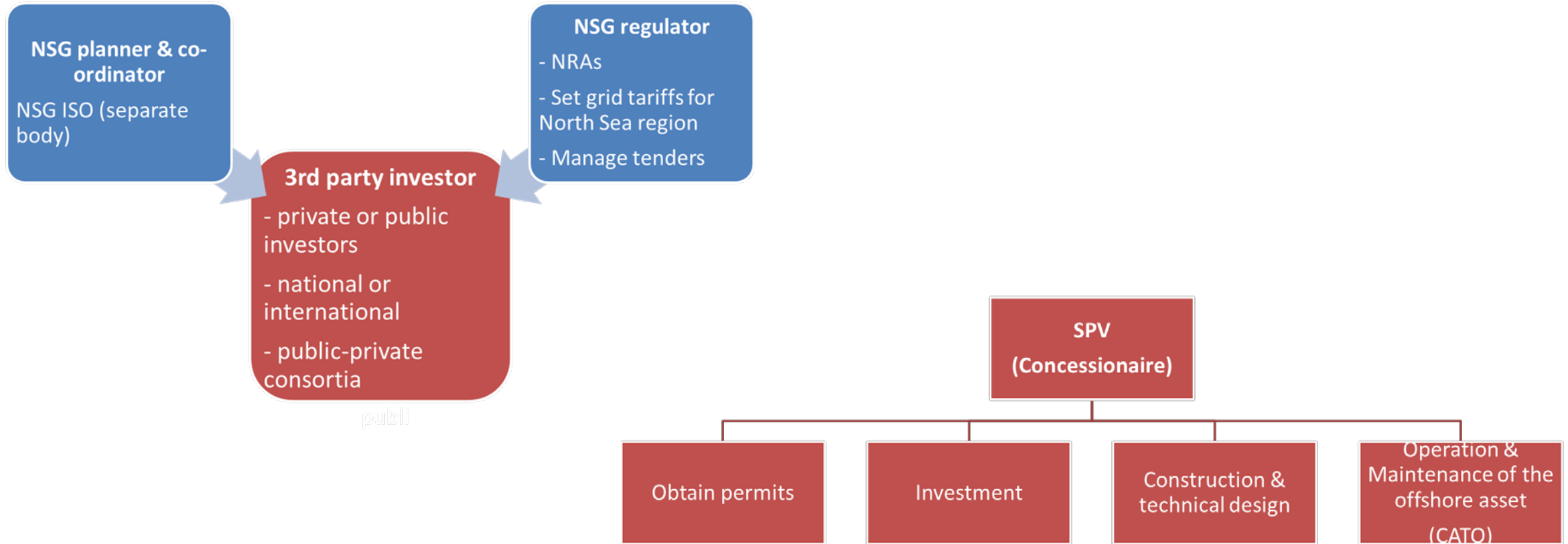
Model 2: National TSOs - Evaluation

- Existing regulatory basis and structures already in place

- Challenges:
- Private equity provision constraints
- Additional regulations for cross-border connections of OWFs
- Great effort for co-ordination and convergence of different regulations

- Set up a NSG ISO to ensure efficient management and development of the MOG
- NSG ISO complementary to national TSOs
- Set up a NSG regulator responsible for:
 - setting up a common grid tariff system
 - common business plans
 - streamlined cross-border investments
 - clearer revenue streams
 - eliminate investor risks

Model 3: 3rd party investor



Model 3: 3rd party investor-International experience

- International experience in tendering of transmission assets of Brazil, Peru and UK
- Brasil: 1999-2017 → ~90000 km transmission lines → 24% cost savings
- Peru: 100% of the high voltage transmission system is in private hands
- UK: introduction of competition in onshore transmission grid → CATO (Competitively Appointed Transmission Owners)
- Key learnings:
- A stable, long-term legal & regulatory framework
- Multiple transmission owners co-exist without compromising the efficiency & security of the system
- Significant cost savings
- Increase efficiency

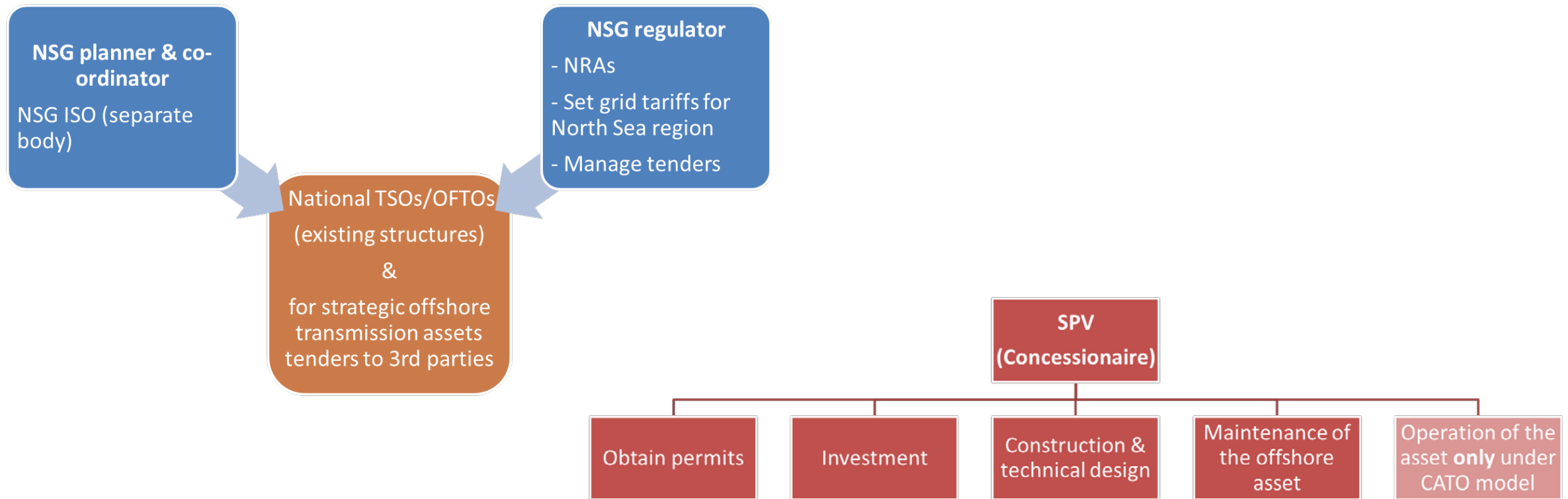


Model 3: 3rd party investor - Evaluation

- Private equity provision is facilitated through tenders.
- Higher competition for construction and technical design of offshore assets:
 - capital costs savings
 - create cost benchmarks
 - increase innovation
- At the same time more transmission assets can be built

- Challenges:
 - Legal restrictions in some countries on implementation of the 3rd party model
 - Exclusion of the current TSOs' role
 - Higher effort for communication and co-ordination with several entities
- Set up a NSG ISO for:
 - grid planning
 - system needs
 - stronger operational co-ordination of the MOG
- Set up a NSG regulator for:
 - common grid tariff system
 - manage tenders

Model 4: Combined model



Model 4: Combined model - Evaluation

- Private equity provision is facilitated.
- Introduction of competition for construction & technical design
- Capital cost savings
- Create cost benchmarks
- Increase innovation

- Challenges:
 - Legal constraints for application of 3rd party investor model
 - Higher effort for communication and co-ordination with several entities
- Set up a NSG ISO:
 - operational co-ordination
 - efficient management and development of the MOG
- Set up a NSG regulator:
 - common grid tariff system
 - manage tenders

APPENDIX

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