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CONTRACTING ISSUES IN THE GREEN HYDROGEN ECONOMY

Master Class on ‘Financing Green Hydrogen in South Asia’ – 3 Part Series

RIYAZ BHAGAT, PARTNER | DECEMBER 2023

ABOUT TRILEGAL

Trilegal

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Full-service law firm with diverse and deep expertise that enables collaboration among lawyers for innovative approaches to solve client issues

Uniquely structured to enable the right people to work on the right opportunities

Committed to diversity and inclusion

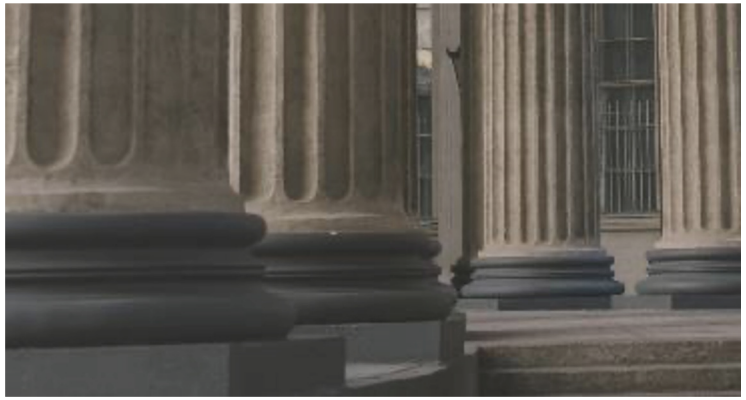
Preferred partners for complex, domestic and cross border transactions

115	850+	5 offices	20+
Partners	lawyers	across India	annual recognitions

Overview of our practice areas

Trilegal is recognised as having a market leading practice, with a clientele that includes leading international and Indian companies.

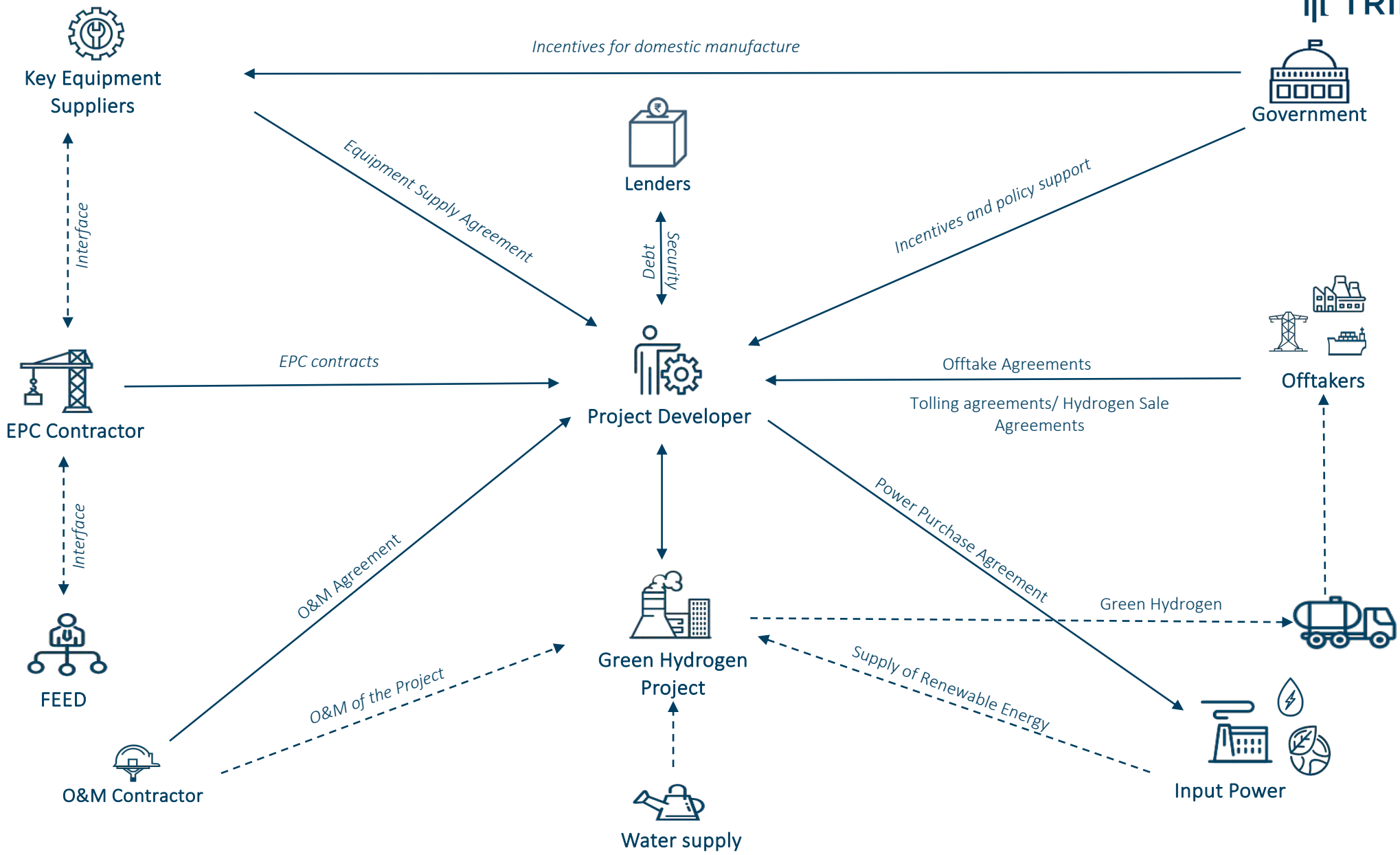
We frequently advise our clients on complex matters involving elements of Indian corporate laws and the legal & regulatory issues that impact business.



- Asset management and funds
- Banking & Finance
- Capital markets
- Competition
- Corporate advisory
  - Mergers and acquisitions
  - Joint venture and entry strategy
  - Private equity
  - Restructuring and Insolvency
- Dispute resolution and litigation
- Energy and Infrastructure
- ESG and Climate Change
- Financial Regulatory & Enforcement
- Governance and compliance
- Labour and employment
- Real estate
- Tax
- Technology, Media and Telecom (TMT)
- White collar crimes and investigation

GH2 VALUE CHAIN

GH2 Value Chain



OFFTAKE AGREEMENTS

Offtake Agreements – Contract Structures

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- Input power and water provided by offtaker
- Capacity payment – for reserving capacity of electrolyser (fixed price)
- Utilization payment – for use of electrolyser (to cover variable costs + margin)

- The offtaker pays the producer a fixed or variable (indexed) price for fixed or variable volumes
- Predictable source of cash flow lends bankability to the structure in case of fixed offtake contracts
- Variable volume and variable price. Price typically tied to market index

- Establishment of an intermediary mandated to aggregate demand and supply of GH2 or its derivatives
- Price discovery through competitive auctions which offer fixed term HPAs
- Standard form offtake agreements with offtake certainty
- Key commercial terms regarding delivery, take-or-pay, certification methodologies etc. specified up front

Offtake Agreements - The Big 5

5 critical aspects of a GH2 offtake agreement that move the needle on risk

Pricing

Fixed v. Variable? Pricing of inputs (power and water) will go towards determining pricing of GH2

Certification of Hydrogen

Obligation to procure and maintain GH2 certification backed by adequate guarantees and penalties for non-compliance

Force Majeure and Regulatory Risk

Robust FM and regulatory risk apportionment is crucial – change in law clause which allows review of pricing

Take or Pay

Negotiating ”take or pay” clauses will likely be required – to go hand in hand with make-up rights

Risk Allocation

Supply obligations, insurance and transportation

INPUT POWER

Input Power

Structures

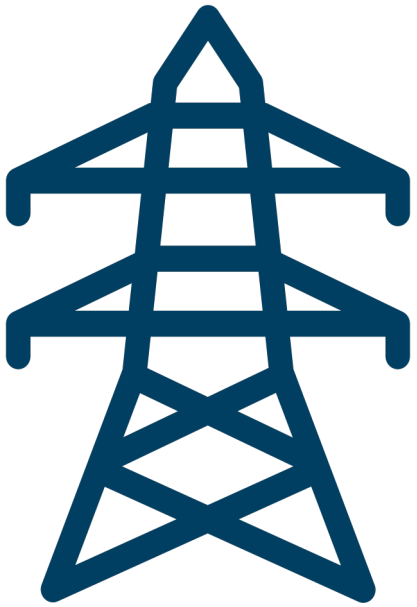
- Captive plant – co-located
- Open access – captive/ group captive/ third party
- Green energy markets

Regulatory framework

- Enabling regulatory framework critical for sourcing input power. GNA^{RE} and T-GNA^{RE} framework and infrastructure for exclusive supply of RE power
- Monthly banking facility for input power procured for GH2 production
- Waiver of cross-subsidy surcharge and additional surcharge on input power procured through open access

Power Purchase Agreements

- Long term PPAs – aligned with hydrogen offtake agreements
- Preference for fixed levelized tariff for the term of the PPA, may be inclusive or exclusive of applicable transmission/open access charges
- Minimum supply guarantee – scheduling and availability of input power. Penalties for short fall to be structured to compensate for additional costs incurred for procuring power from the market, with a commercially agreed cap on liability
- Payment security – typically for a few months worth of tariff payments
- Delays in commencement of supply can impact B2B supply commencement under HPAs – need for appropriate penalties



- Curtailment and grid unavailability – supply of power may be impacted by curtailment of generation from the RE plant for reasons of grid safety and stability

DESIGN, EPC AND OPERATION

Design and Contractor Selection

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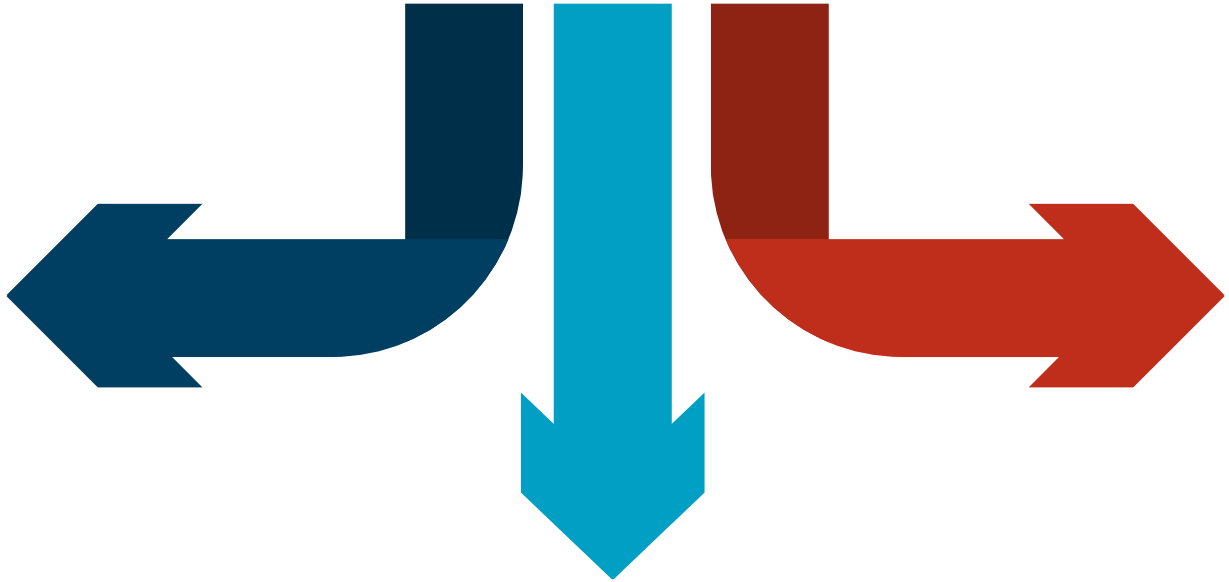

Pre-FEED

- ❑ Preliminary design activities
- ❑ Equipment selection
- ❑ Basic designs and specifications
- ❑ Permitting support

FEED

- ❑ Optimization of preliminary designs
- ❑ Aligning designs for performance targets
- ❑ Identification of major equipment
- ❑ Designs based on regulatory requirements

Selection of EPC Contractors

- ❑ Availability of turnkey service provers
- ❑ Major equipment vendors who are able to deliver on required specifications
- ❑ Domestic supply v. import requirements

Contracting Structures

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Turnkey and EPC Wrap Structure

- One contractor
- **Cost** - The cost to the project owner is likely to be higher as these arrangements carry a premium
- **Availability of service providers** - Providing turnkey services, and assuming the risks associated with it, may not be commercially attractive to contractors in the market.
- **Interface Risk** - Project development is de-risked to a certain extent as risk of interface and coordination is passed on to contractor

Multi Contracts / Split contracts

- Multiple contractors
- Project owner to bear risk of interface and coordination between various contracts and workstreams
- Likely to be easier to find in terms of an EPC solution going forward

Risk Mitigation

- Appointing experts for coordinating and managing project development through EPC management contracts
- Aligning program delivery schedules, completion milestones, and progress reporting across different contracts
- Develop robust information sharing and coordination protocols between all contractors

Equipment Supply, Installation and Commissioning

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01

Delivery Schedule and Delay Consequences

(1) Critical for the delivery schedule to reflect a reasonable assumption of time required for manufacture, transportation, delivery; (2) Maintaining control over the schedule is key – acceleration, step-in rights; (3) Delay consequences

02

Performance Guarantees

Performance guarantees for the key equipment to be aligned with design specifications and plant output requirements. Agreement to specify consequences of failing to meet the guarantees – penalties with caps on liability

03

Payment Security

Given the high value of key equipment such as the electrolyser, suppliers may require adequate payment security by way of a letter of credit or a bank guarantee securing a significant chunk of the price

04

Warranty and Defect Liability Period

Contracts should be clear on: (1) the extent of the supplier's defect rectification and warranty obligations; (2) exclusions to the warranty; and (3) remedies for breach of warranty

05

Balance of Plant

Civil work, subsystems, infrastructure for input power and water supply

06

Insurance

To cover short term risk exposure during construction – predominantly related to supply/production side – CAR, DSU, construction liability insurance

07

Testing and Commissioning

Multiple tests required before commissioning, including performance guarantee test runs and pre-commissioning tests – Hydrogen purity test, leakage test, compressor assembly tests, drying plant tests

08

Risk Purchase

Negotiating risk purchase provisions take on significance - if the contract is terminated for a supplier default, requiring the supplier to pay bear costs of procuring the equipment from an alternate supplier should be negotiated

Operation and Maintenance

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Availability guarantees for the plant

Annual certification of purity and green credentials

Preventive and periodic maintenance

Scheduling input power

Statutory and regulatory compliances

GH2 Certification

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Input power and water

100% or near 100% renewable energy: wind or solar

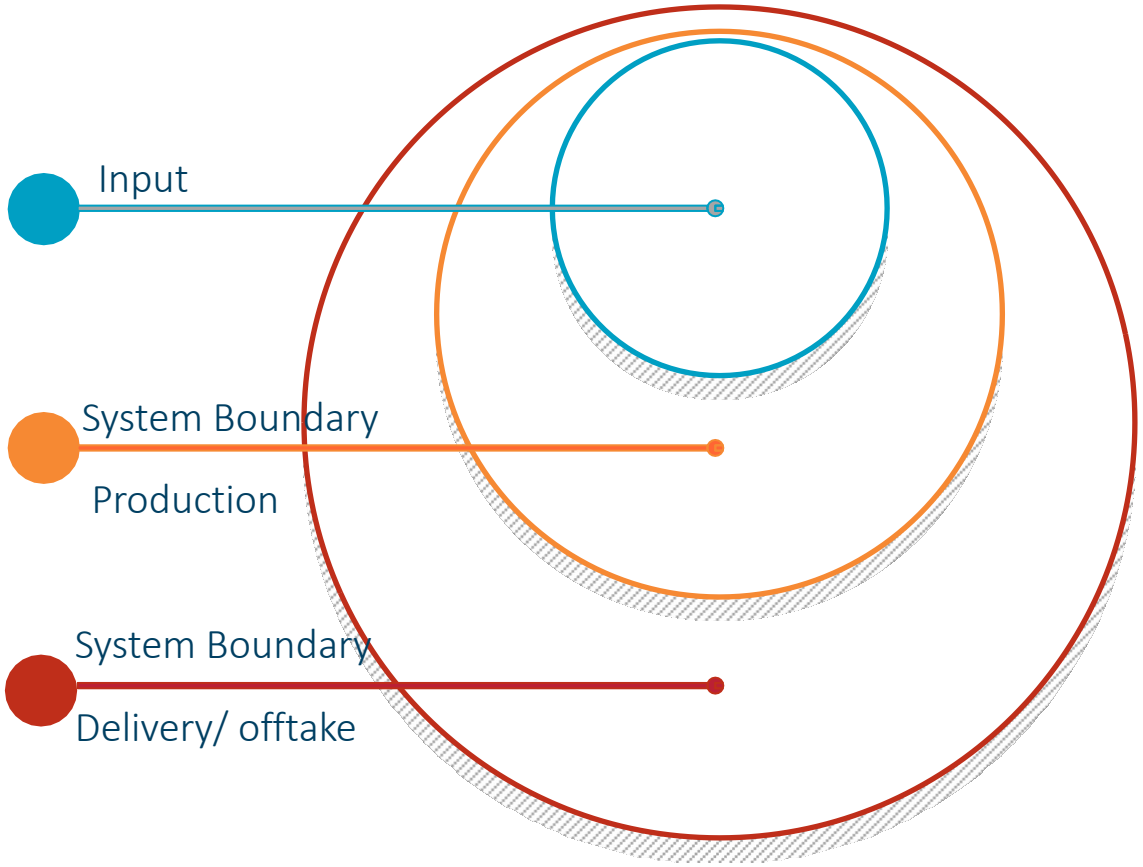
Green Hydrogen Certification

International Standards: >/=1KG CO2 per 1KG H2 per annum

Indian Standard: >/=2KG CO2 per 1KG H2 per annum

Green Hydrogen+ Certification

TÜV SÜD Standards: carbon emissions up to delivery/ offtake of GH2. Input power to be procured from newly installed RE projects



- MNRE to issue a detailed methodology for measuring, reporting, monitoring, onsite verification and certification of GH2 and Bureau of Energy Efficiency notified as the nodal agency
- EPC Warranties and O&M Performance Guarantees to include parameters to ensure GH2 Certification for the plant
- Offtake agreements to provide for a robust change in law mechanism to pass through any additional costs incurred due to change/ introduction of certification standards
- Certification standards may be adopted basis offtaker requirements

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STORAGE AND TRANSPORT

Storage

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Modes of Storage

- Storage tanks (compressed or cryogenic)
- Chemical storage (conversion into more stable derivatives for storage)
- Natural underground storage in salt caverns and salt domes

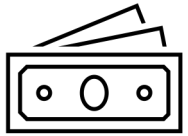
Challenges

01 Hydrogen requires large storage containers that are roughly three times the size used for methane and ten times the size used for petrol

02 Unstable gas poses an increased risk of losses + difficult to identify leaks

03 Unavailability of affordable and less-riskier options such as underground storage caverns and domes in India

Tolling Agreements for Storage



- **Payments**
  - Fixed capacity payment – for reserving capacity of storage tanks
  - Variable utilization payment – for use of storage capacity
- Scheduling of receipt and send-out capacity
- Insurance factored into the tolling agreement to protect against the risk of loss without any transfer in title of green hydrogen; to protect against defaults or FM events
- Change in law mechanism to account for evolving regulatory framework for Green Hydrogen safety standards

Transportation

- Transportation via tankers or cascades (cylinders)
- Typically limited to short distances – relevance for export
- Bottling facilities – external service provider or captive facility
- Transfer of risk and title
- Delivery and re-delivery
- Fixed transportation charges – periodical v. unit based

PIPELINES

TRUCKS

- Dedicated pipelines v. Utilising existing network
- **Dedicated pipelines**: (1) Capacity payment – for reserving capacity of pipeline (fixed price); (2) EPC model where ownership vests with offtaker or producer; (3) RoW issues
- **Existing pipeline network** – (1) contracts with pipeline owner for utilisation; (2) exclusivity and open access
- Transfer of risk and title
- Delivery and re-delivery

DISPUTE RESOLUTION

Dispute Resolution – Creating a better standard for GH2

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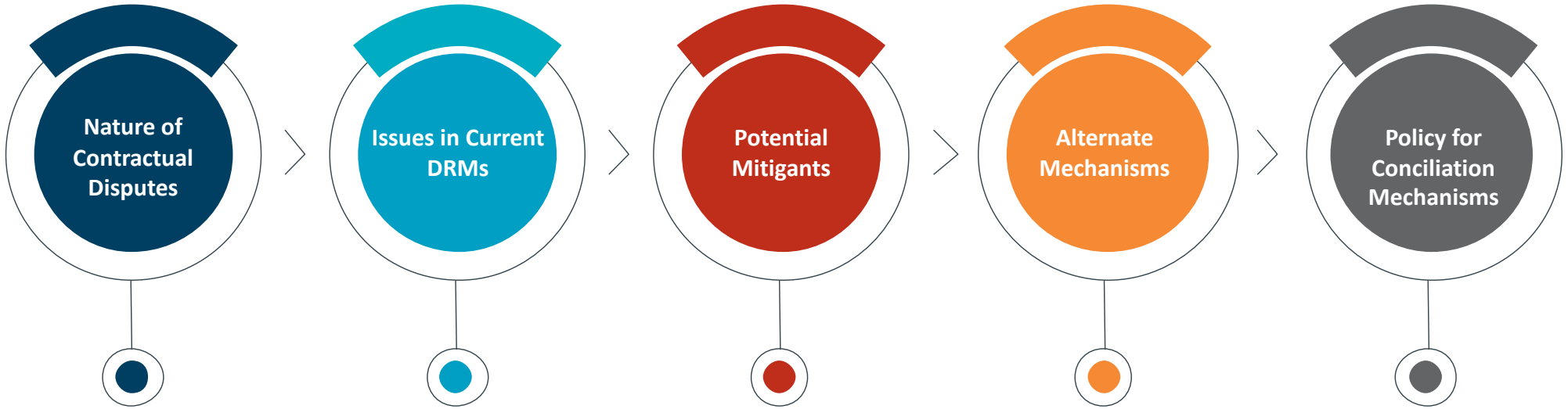

- Potential for disputes on numerous aspects
- Natural considering the various factors at play
- Potential contentious areas include pricing, green credentials, damage or loss

- Unnecessarily lengthy processes
- Lack of periodical reconciliation negatively affects cash flow
- Lack of technical expert intervention and adjudication

- Time-bound process
- Clearly defined authority
- Mechanism for rapid reconciliation – daily, weekly, monthly
- Aim to negate cash flow issues

- 3-tier dispute resolution mechanism
- Reconciliation mechanisms to be coupled with expert adjudication for technical matters
- Arbitration to be last resort

- Need for governments to consider conciliation forums and committees
- Members can be experts with prior experience in complex energy contracts
- Successful conciliation is binding

CROSS BORDER CONTRACTING

Cross-border Contracting Principles

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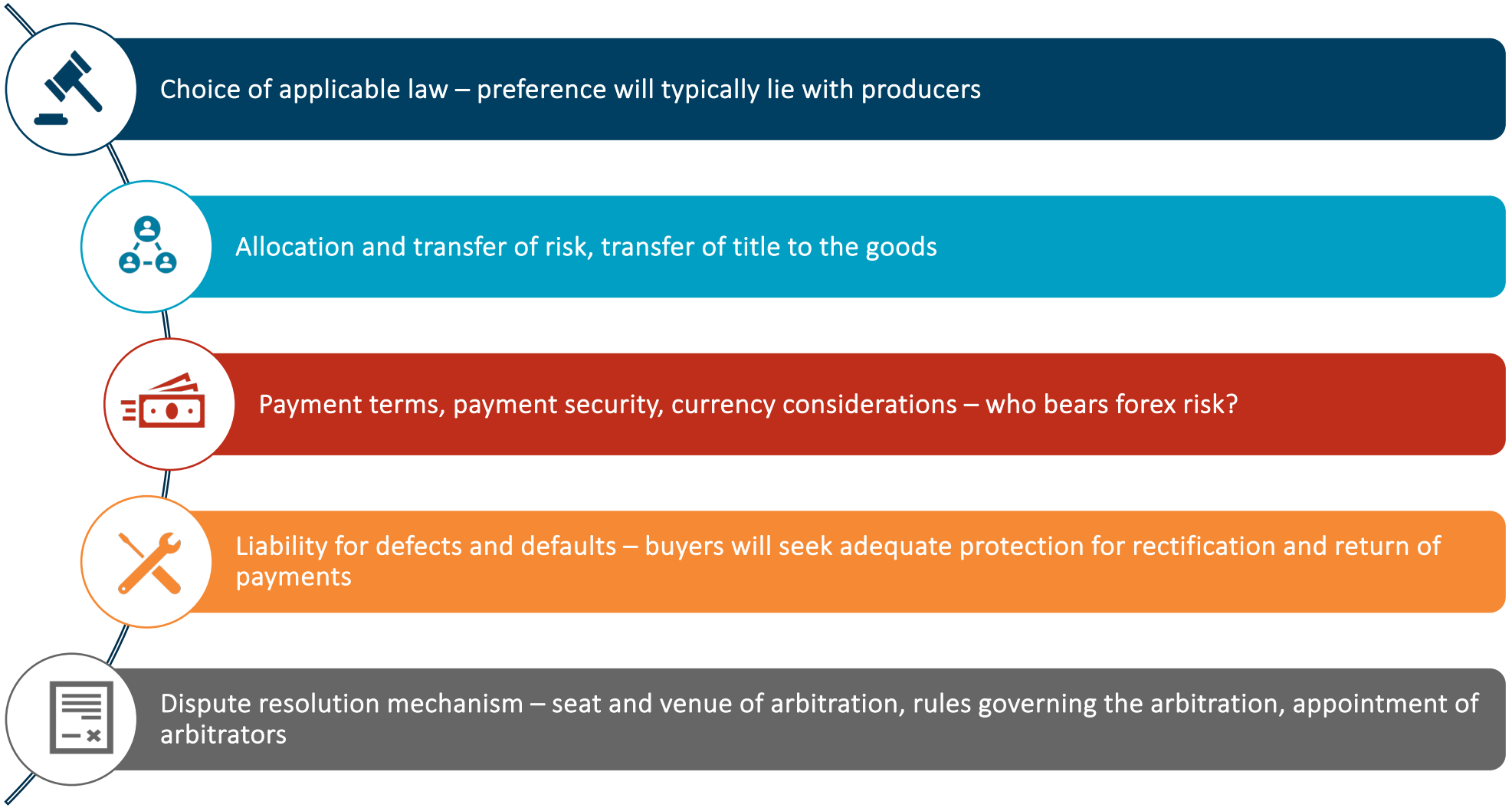

Questions?

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