

# Financing Nuclear New Build:

## Lessons Learned from Recent Projects

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# Outline

## **1. Context**

- Nuclear Energy in Pathways to Net Zero
- The Importance of Financing for the Competitiveness of Nuclear Energy

## **2. NEA Case Studies on Financing Frameworks for Nuclear New Build**

- Presentation of Selected Case Studies
- Comparative Analysis

## **3. Lessons Learned**

# Context

## *Nuclear Energy in Pathways to Net Zero*

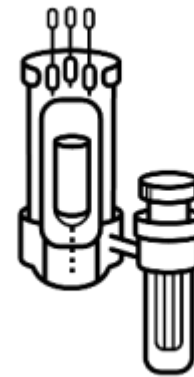
# The Full Potential of Nuclear Energy to Contribute to Emissions Reductions



**Long Term  
Operation**



**Large  
Generation III  
Reactors**



**Small Modular  
Reactors**



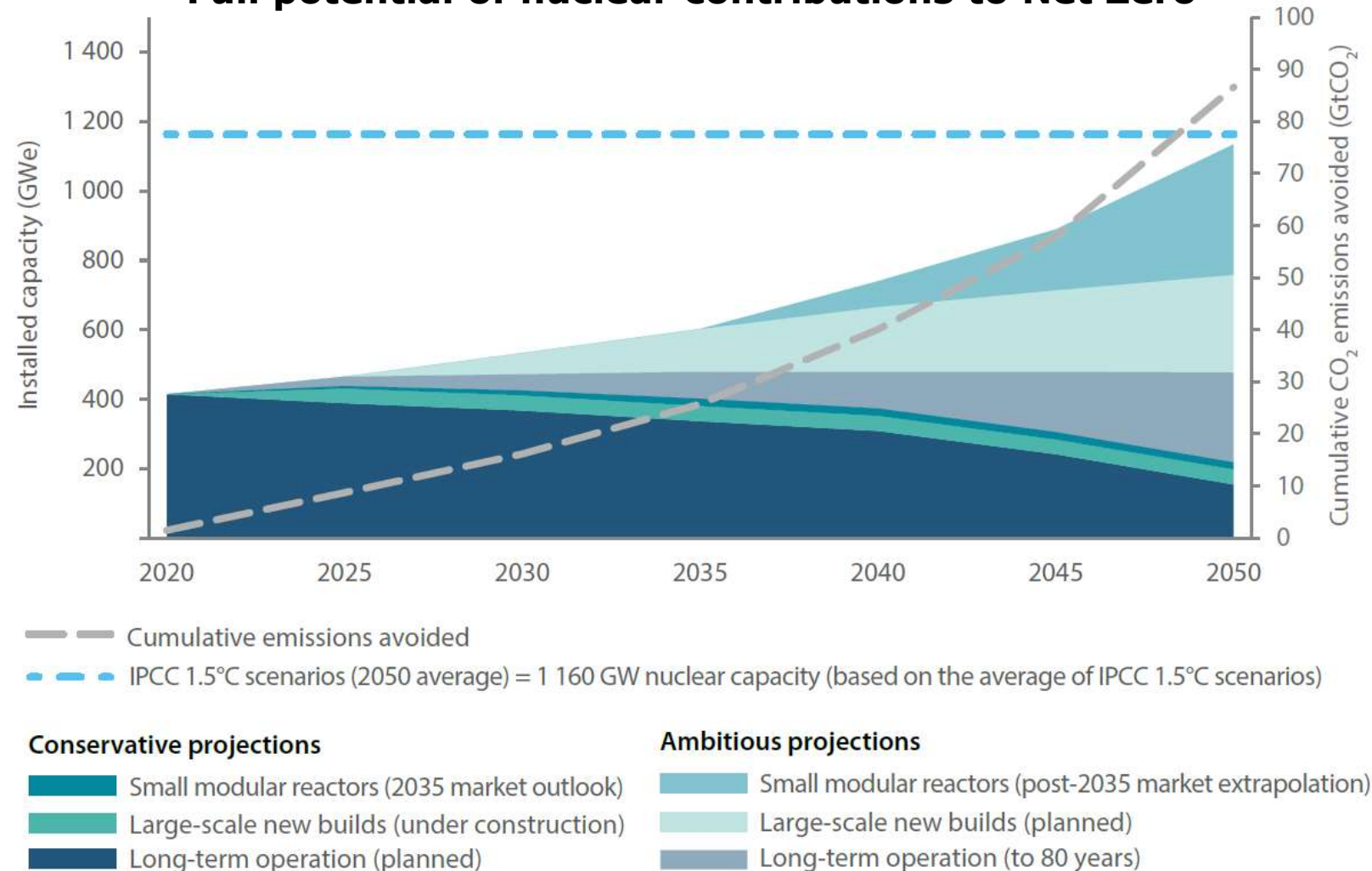
**Non-Electrical  
applications**

**Complementary nuclear technologies and applications**

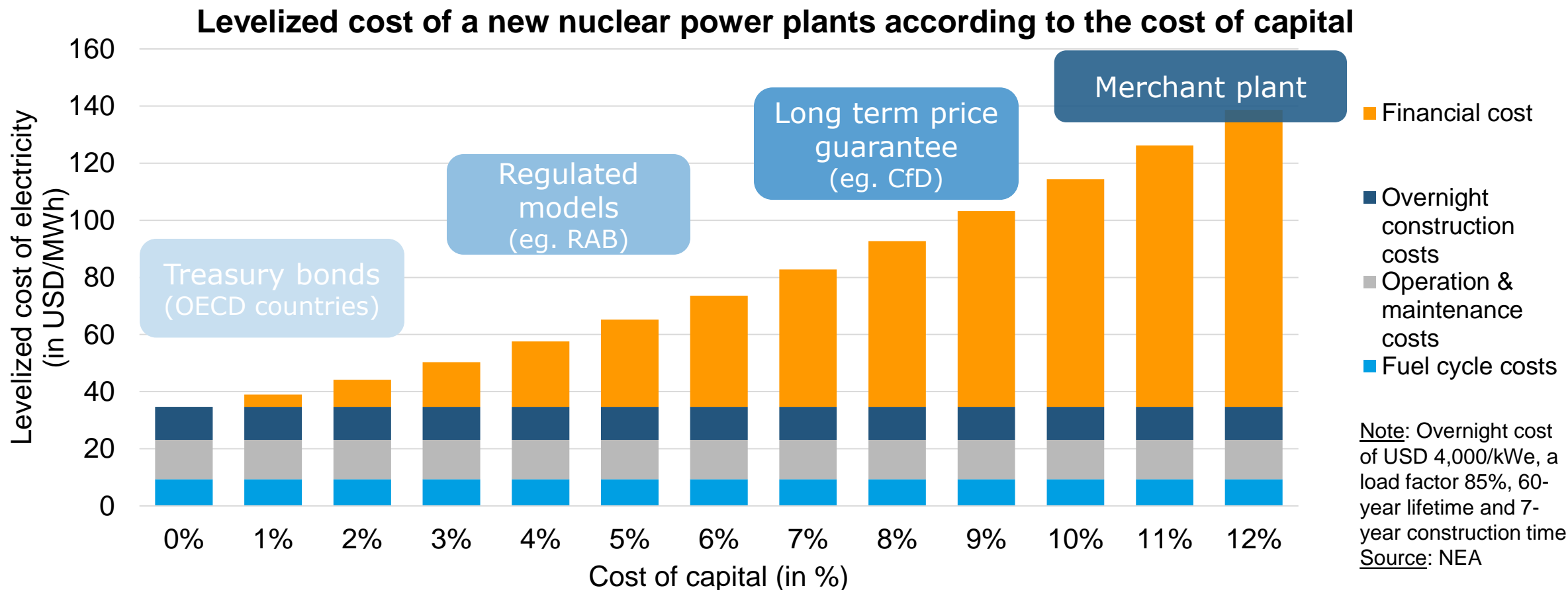
# Nuclear Installed Capacity Could Triple in Order to Reach Net Zero by 2050

- Meeting the ambitious projections will require to **increase financial flows in nuclear new build by at least one order of magnitude** compared to conservative projections
- Assuming an overnight construction costs of USD 4000/kWe, investments in new nuclear capacity would exceed **USD 100 billion per year** (without factoring in the cost of capital)

Full potential of nuclear contributions to Net Zero



# The Cost of Nuclear Energy is Dominated by the Cost of Capital



Cost of capital reflects risk allocation and mitigation decisions  
Market risks and construction risks are the two key categories of interest for nuclear new build

# **NEA Case Studies on Financing Frameworks for Nuclear New Build**

# Objectives and Structure of the NEA Nuclear Financing Case Studies

## Objective

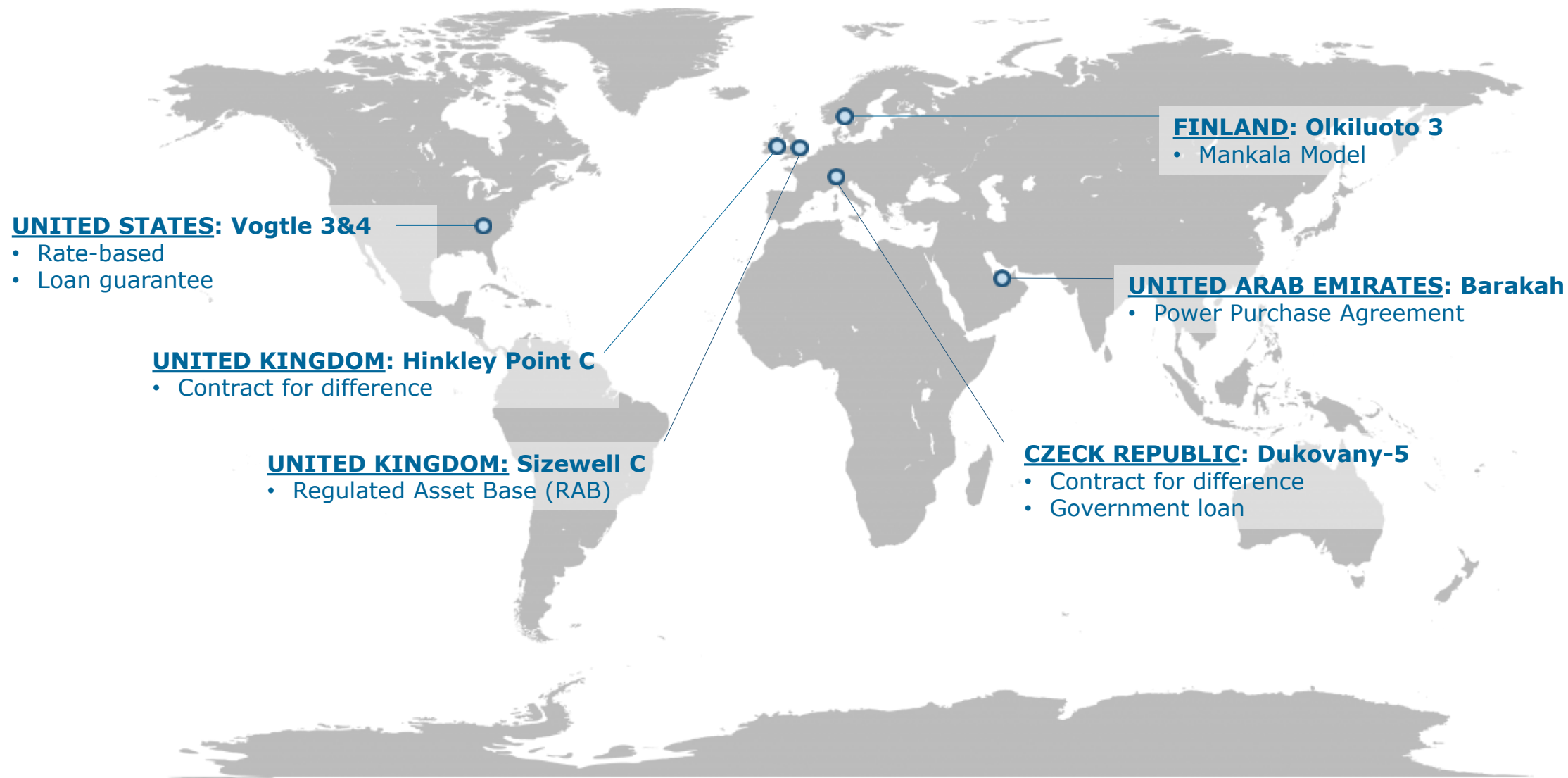
- Provide policy makers with a single authoritative document to understand the key features regarding the main frameworks for financing nuclear new build, primarily in OECD/NEA countries
- Complement NEA conceptual work on new nuclear financing with policy relevant examples about different frameworks being pursued to allocate and mitigate risks

## Structure

- Project background and structuring
- Timeline
- Financing framework
- Risks allocation
- Role of the government



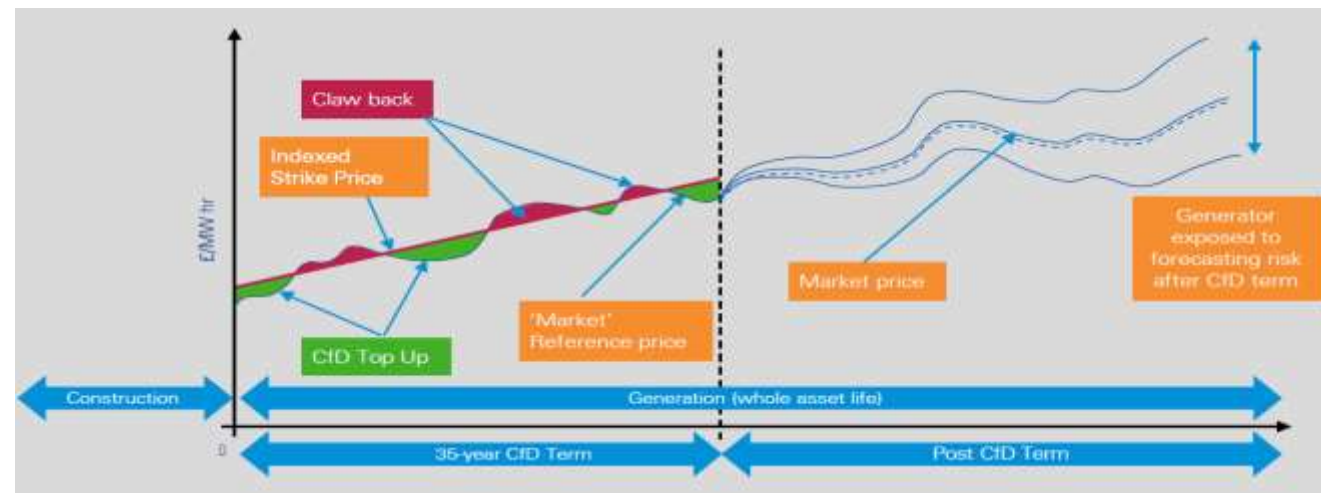
# NEA Nuclear Financing Case Studies



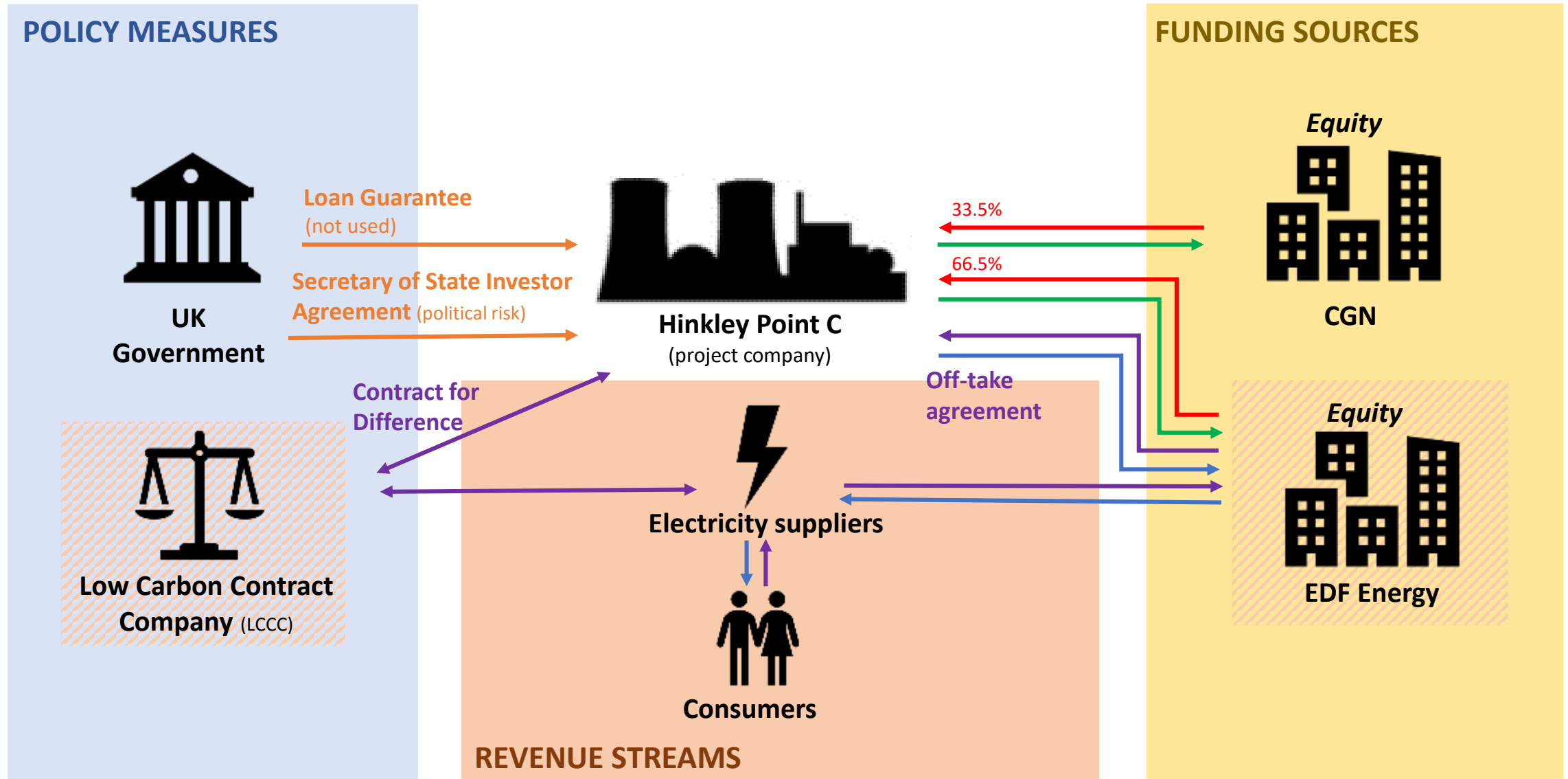
# Hinkley Point C – Contract for Difference

- HPC financed by its private shareholders (EDF Energy and CGN) but benefits from several policy support mechanisms :
  1. **Contract for Difference** at £92.50/MWh (+ inflation)
  2. **Secretary of State Investor Agreement** that guarantees payments in the case of a change in energy policy
  3. **Loan Guarantee** (option not used to date)
  4. **Decommissioning and waste management fee**
- Project owners take all construction and completion risk and finance the project on their balance sheet.
- **WACC = 9.2%** (at time of investment decision)

HPC Contract for Difference model



# HINKLEY POINT C – FINANCING FRAMEWORK



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# **Comparative Analysis**

***Focus on Construction Risks from Cost Overruns and Delays***

# Allocation of the Construction Risks from Cost Overruns and Delays

|                         | <b>Olkiluoto 3</b><br>(FL, 2005-) | <b>Barakah</b><br>(UAE, 2012-)  | <b>Vogtle 3&amp;4</b><br>(US, 2013-) | <b>Hinkley Point C</b><br>(UK, 2018-) | <b>Sizewell C</b><br>(UK, planned) | <b>Dukovany-5</b><br>(CZ, planned)        |
|-------------------------|-----------------------------------|---------------------------------|--------------------------------------|---------------------------------------|------------------------------------|---|
|                         | <i>Mankala model</i>              | <i>Power Purchase Agreement</i> | <i>Rate-based Loan guarantee</i>     | <i>Contract for Difference</i>        | <i>Regulated Asset Base</i>        | <i>Contract for Difference State loan</i> |
| <b>EPC / vendor</b>     |                                   |                                 |                                      | EDF                                   |                                    | <b>TBD</b>                                |
| <b>Owner operator</b>   |                                   |                                 |                                      | EDF                                   |                                    | <b>TBD</b>                                |
| <b>Equity providers</b> |                                   |                                 |                                      | EDF                                   |                                    | <b>TBD</b>                                |
| <b>Debt providers</b>   |                                   |                                 |                                      |                                       |                                    | <b>TBD</b>                                |
| <b>Consumers</b>        |                                   |                                 |                                      |                                       |                                    | <b>TBD</b>                                |
| <b>Governments</b>      |                                   |                                 |                                      |                                       |                                    | <b>TBD</b>                                |

High risk exposure
  Moderate risk exposure
  Limited risk exposure
  No risk exposure

- In recent years, EPC / vendor have carried a significant share of construction risks
- Hinkley Point C is the exception where the owner-operator carried most of the construction risk
- For future projects, both Sizewell C and Dukovany-5 are looking at alternative frameworks for risk allocation

# Lessons Learned

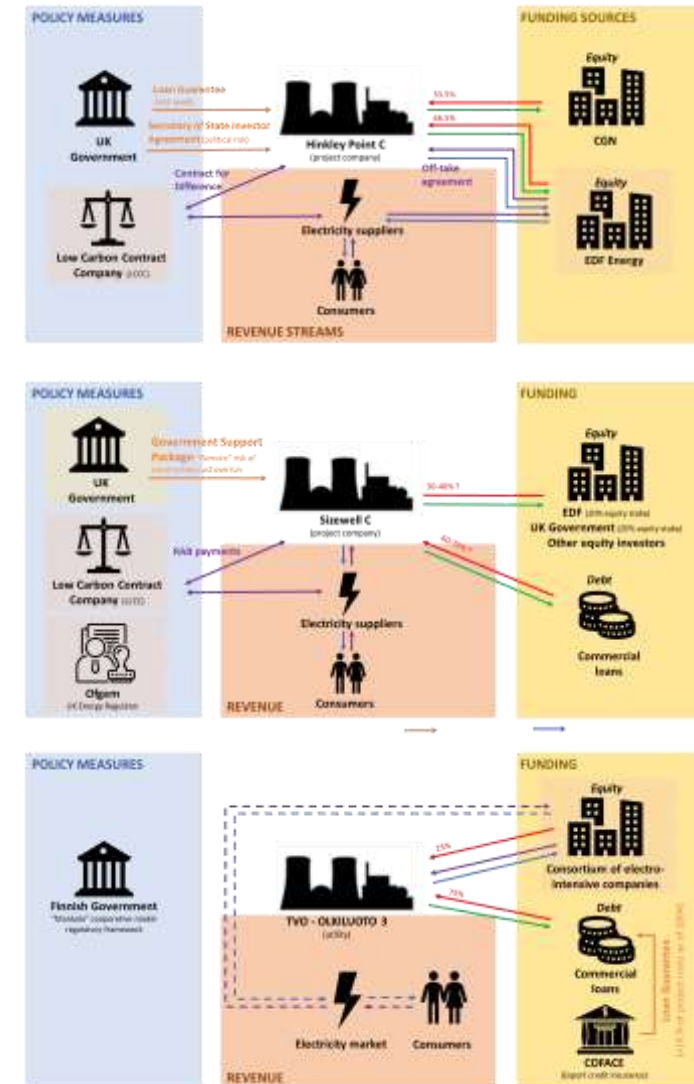
# Key Lessons Learned

1. Financing frameworks remain closely linked to **national and industrial contexts**
2. **De-risking construction** is key to attracting additional sources of funding and to reducing the cost of capital
3. **Financing frameworks cannot solve structural problems** caused during upfront project planning
4. **Aligning stakeholder interests** should remain an overarching principle



# Financing Frameworks Remain Closely Linked to National and Industrial Contexts

- **Financing frameworks do not exist in a vacuum**
  - Financing interacts with national and industrial contexts
- **Lessons learned must be contextualized before they can be transferred to other settings**
  - This requires a solid understanding of how a financing framework connects to the policy and industrial environments:
    - **National context:** RAB across infrastructure projects in the UK contributes to investor confidence
    - **Industrial context:** Energy utilities' market capitalization limits the role they can play in financing new nuclear projects.



# De-risking Construction is Key to Attracting Additional Sources of Funding and to Reducing the Cost of Capital

- **Construction risks arising from costs overruns and delays are the most significant**
- The case studies demonstrate the need of balancing:
  - The ability to **mitigate risks** *ex-ante* (i.e. before construction)
  - The ability to **absorb risks** *ex-post* (i.e. during construction)
- The RAB model is to-date the most advanced example of a financing framework that reconciles market-based principles with an allocation of construction risks:
  - **Mitigating risks:** Investors remain incentivized to mitigate construction costs overruns
  - **Absorbing risks:** Above a pre-agreed project costs baseline, an increasing share of the costs overruns is placed on ratepayers or – for remote risks – on taxpayers



# Financing Frameworks Cannot Solve Structural Problems Caused During Upfront Project Planning

- Effective project management and delivery structure are key to efficient construction risk mitigation and a prerequisite to developing financing



# Aligning Stakeholder Interests Should Remain an Overarching Principle

- The importance of allocating risks between parties should not distract from the **overarching objective of aligning stakeholder interests.**
- Strategic equity stakes from key stakeholders can not only contribute to financing but also **increase the project's overall chances of success.**







**Thank you for  
your attention**