IAEA 60 Years
Atoms for Peace and Development

Funding Spent Fuel Management and Decommissioning

Latin American Nuclear Energy Stakeholders' Conference

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The ‘Milestones’ context

- The Milestones approach touches on funding decommissioning & SNF management (“back end liabilities”) under Issue #4 in Phase 1 & 2:
  - By the end of Phase 1
    - “*Mechanisms for funding a range of key activities…[should] have been defined [including]…*
      - *i. storage and disposal of radioactive waste including spent fuel disposal*
      - *j. decommissioning ”*
  - By the end of Phase 2
    - *“Proposed means for funding spent fuel, waste management and decommissioning [should have been] established…”*

Plan of presentation

- Presentation will address the funding of these ‘back-end’ liabilities
- ‘Back-end liabilities’ are costs which will have to be paid after the station ‘End Of Life’ (EOL):
  - Costs of station decommissioning
  - Costs of SNF disposal
- Typically a station operator will make deposits into a fund during the years of plant operation
  - Recommended approach
    - Discussion in the Joint Convention
    - ‘Intergenerational equity’

Key components of a plan

- There are two key components of any plan to ensure ‘back end’ liabilities are funded:

  1. **A target value for the fund(s) at station EOL**
     - An amount of money to be available at station End Of Life (EOL) to meet ‘back end’ liabilities
  2. **A contribution schedule until station EOL**
     - Time profile of deposits into fund(s)

- “Getting these right!” is a significant challenge!
  - Underlying assumptions are subject to considerable risk and uncertainty
    - Periodic revision is one way to address this risk and uncertainty

Deriving a target value

- Engineers derive cost estimates
  - Overnight cost estimates!
- Economists project changes in prices
  - Unit labour costs
  - Unit materials costs
- By applying cost escalation factors to overnight cost estimates we can arrive at a target value!
  - Risk and percentiles

Deriving a contribution schedule

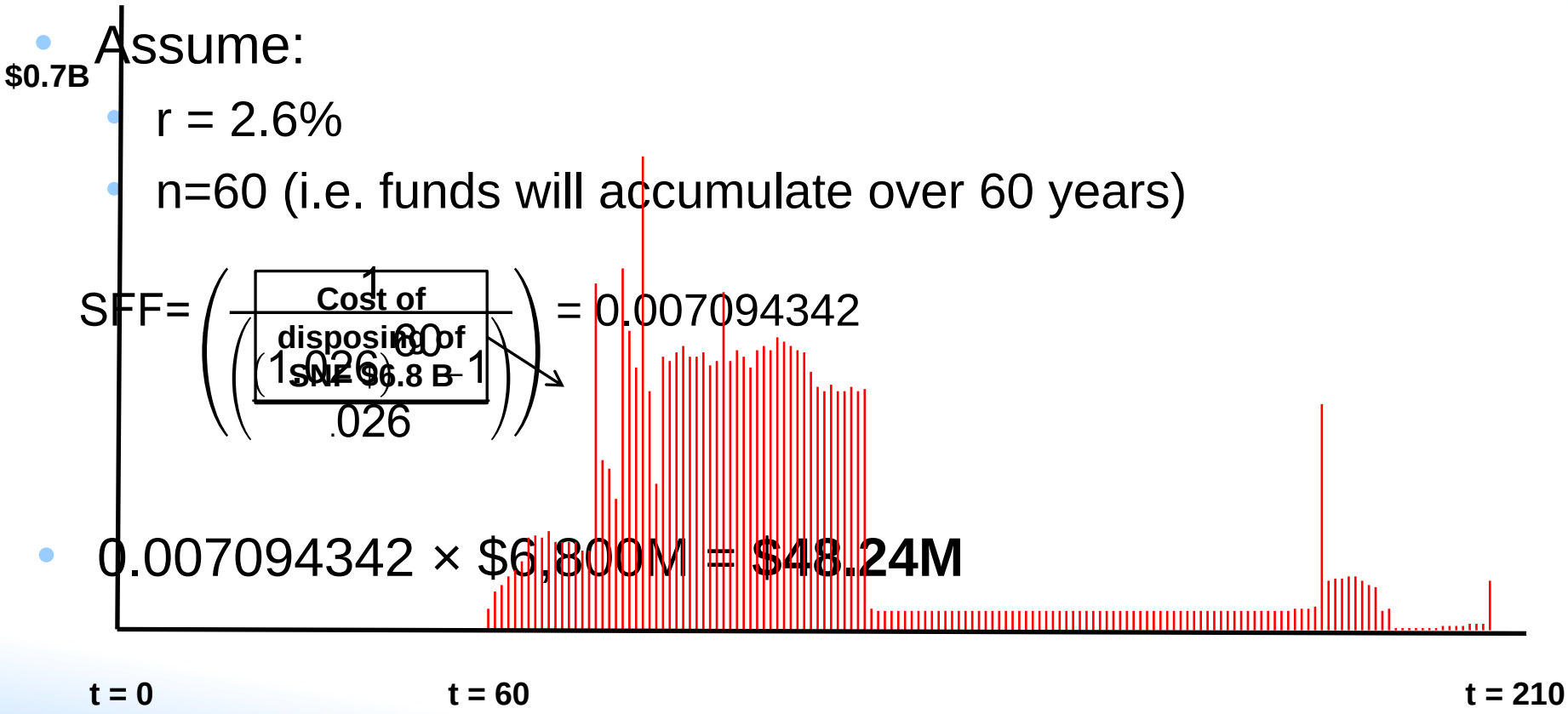
- If I had to pay $1000 in 20 years and I wanted to fund it in advance, I could deposit $X in the bank today and every year for the next 20 years
  - Is X = 50?
    - ***No!***
    - I would deposit X < 50 because this money would earn interest
  - I could ask "How much will I have to deposit each year so I will have $1000 in 20 years?
- That is the key to deriving a contribution schedule
  - We can derive a very simple contribution schedule (equal contributions) using a Sinking Fund Factor
    - Lets consider the application of a SNF to the Canadian 'Adaptive Phased Management' SNF disposal solution…

Example

- If the fund(s) have $6.8B at the end of station life they will be sufficient to pay APM costs
- Assume:
  - r = 2.6%
  - n=60 (i.e. funds will accumulate over 60 years)

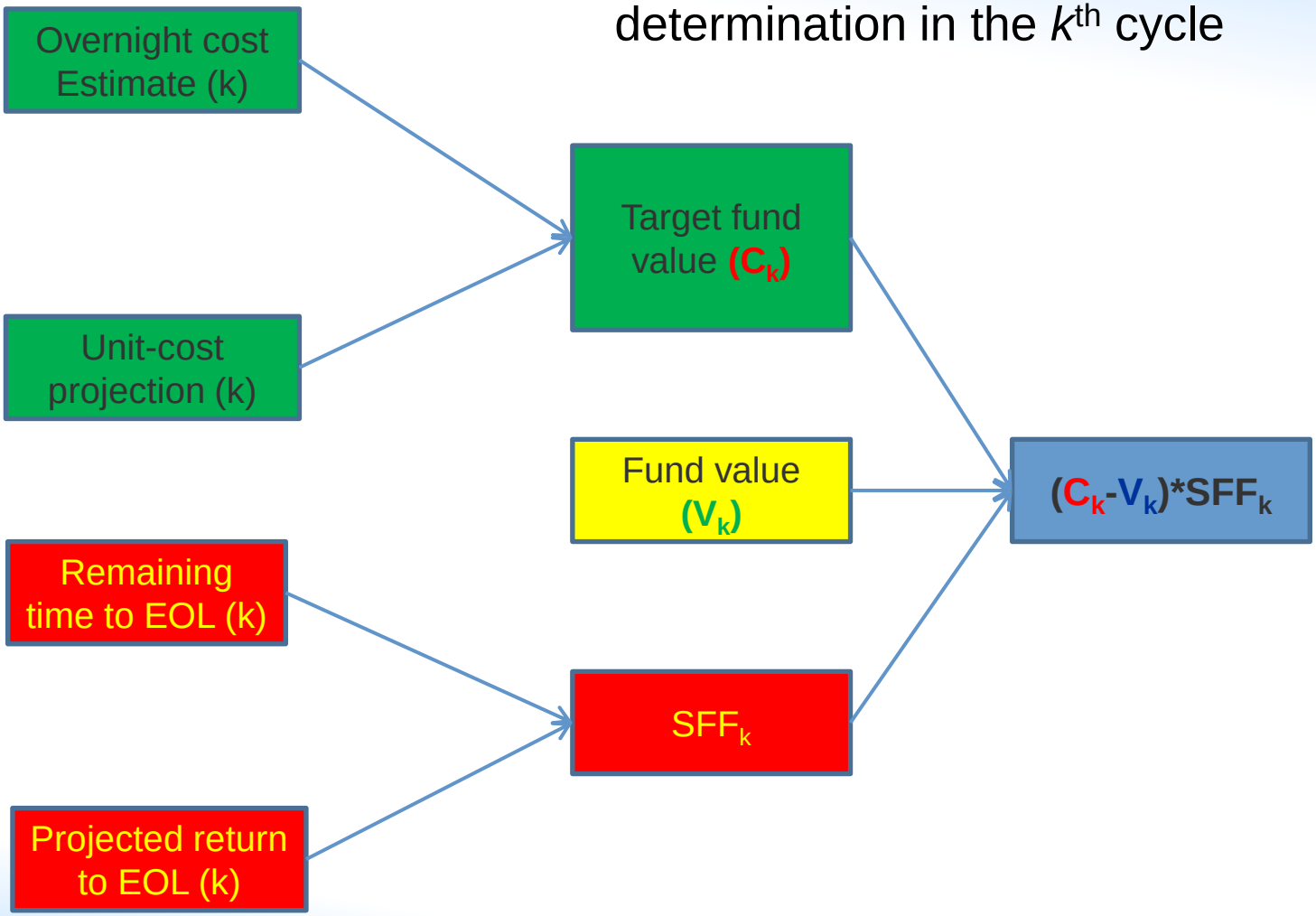
$$SFF = \left(\frac{\text{Cost of disposing of SNF } \$6.8\text{ B}}{\left(\frac{(1.026)^{60} - 1}{.026} \right)} \right)^{\frac{1}{60}} = 0.007094342$$

- 0.007094342 × $6,800M = **$48.24M**



Updating contribution schedule in cycle *k*

Contribution schedule determination in the k^{th} cycle



Thank you!