

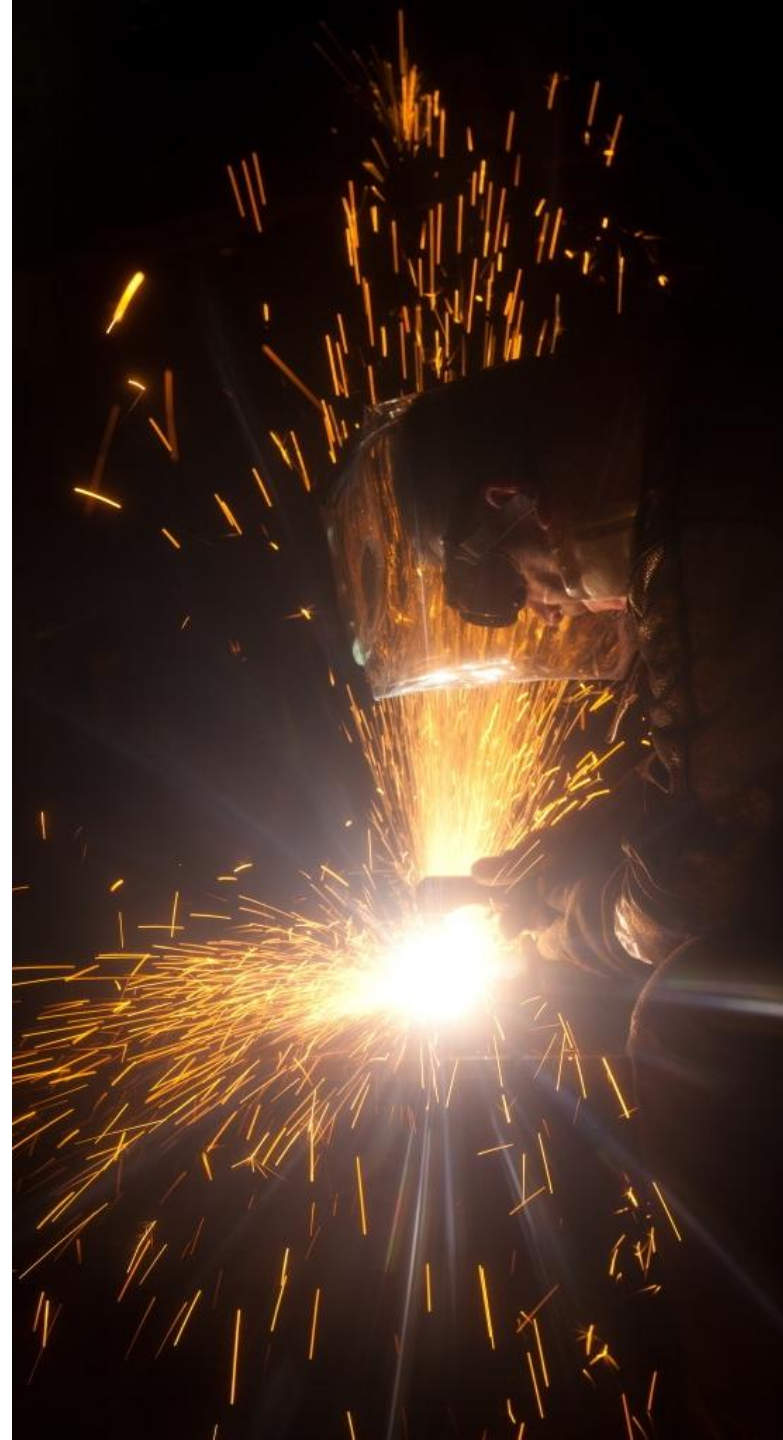


COST ESTIMATING IN DECOMMISSIONING OF NUCLEAR POWER PLANT

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SUMMARY

1. DECOMMISSIONING ISSUES
2. ESTIMATING METHODS
3. EXPECTED FEATURES
4. WHICH METHOD IS THE BEST TO BE USED ?

1

DECOMMISSIONING ISSUES

CONTEXT

- To wait the defined final step for the installation (« back to the green, back to the grey »)
- To maintain permanently the safety of the installation while decommissioning
- To restrict and master exposition of the protagonists and the public to the risks and harmful substances from environment
- To restrict, to pack and evacuate rigorously waste
- **To control the cost (work + waste management)**
- **To control the planning**

OBJECTIVES

- To control the cost & the planning, need specifics methods, and specifics tools
- Methods & tools are chosen in relation with the requirements (precision needed, timescale, phase)

COST ESTIMATING STEPS IN THE DECOMMISSIONING PROCESS

- **Estimates to :**
 1. Define the budget (upstream phase)
 2. Validate the strategical options (APS phase)
 3. Consolidate the ending cost (APC phase)

- **For each phase, data is more or less detailed, the estimate is more or less uncertain (+/-50% -> +/- 10%)**

- **The level of detail of the estimate depends :**
 1. From the level of detail from input data
 2. From the associated need (comparative choice vs. absolute estimate)
 3. From the chosen method

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ESTIMATING METHODS

ANALOGICAL METHOD : BIS REPETITA PLACENT..

The easiest method

Main idea : Once you have already done (or bought) something, if you do it twice, the cost should be the same.

Seems to be easy but...

- Need to be done before (and stored/memorized)
- Need to replace all context elements (physical access, radiological conditions, economical conditions..)
- Accuracy : from +/-10% to +/-500%
- Could be adjusted with others parameters such number of tasks (unitary price reduces with increase of tasks, or dimensions)

PARAMETRIC METHOD : DEFINE THE DRIVER..

Method inspired from aeronautics and automotive.

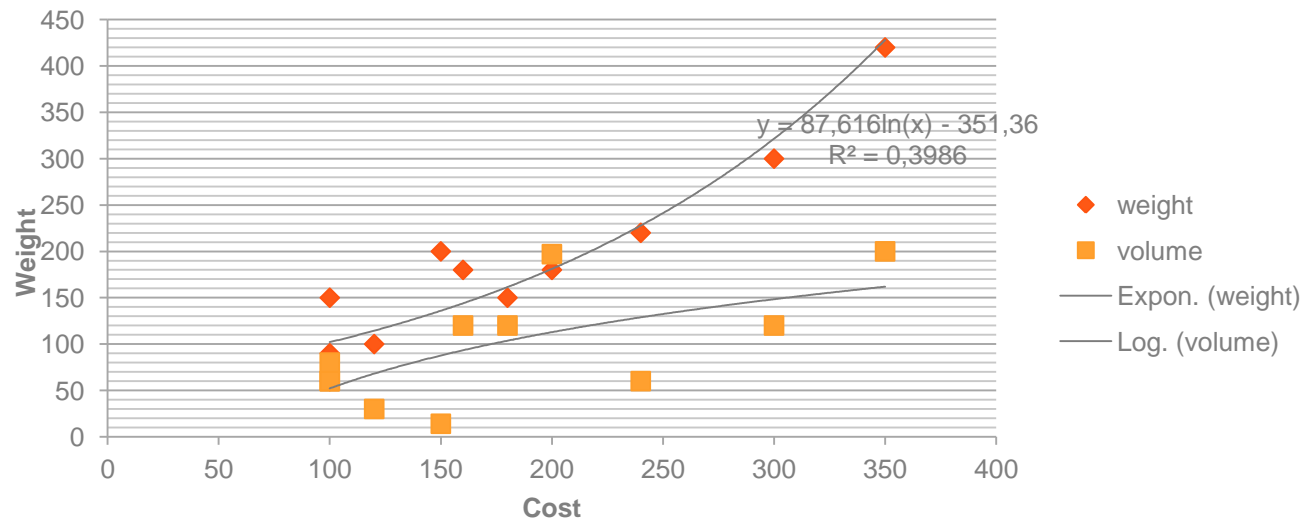
Main idea : for each product, you are able to determine the cost driver(s) that create 80% of the cost.

Driver example : weight, electrical power, dimensions...

- May have a combination of several cost drivers.

- Need lots of values to determine the formula that define the most accurately your product (may not be linear).

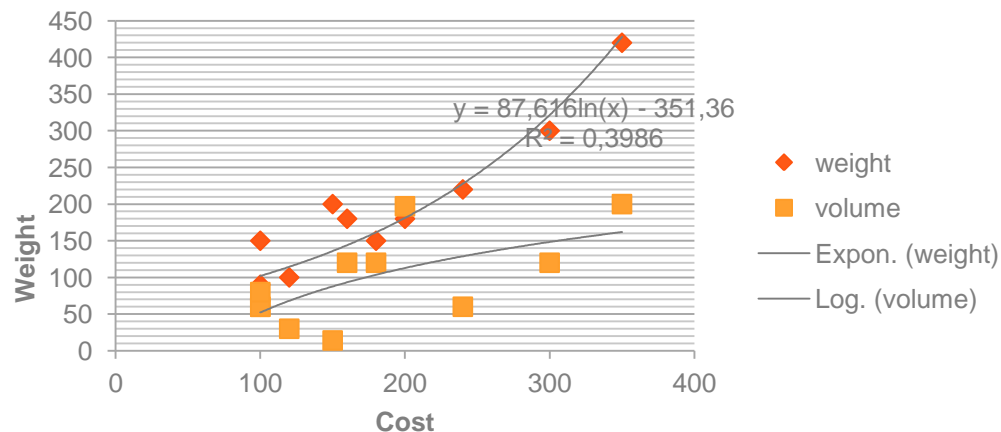
Cost : Weight Vs Volume



PARAMETRIC METHOD : DEFINE THE DRIVER..(2)

Tool required : MS Excel

- Need lot of values
- Quick results
- Works very well in a global definition field (directly linked with existing values)
- May be used for forecast – Be careful, may be at the origin of big mistakes (scale factor)
- Accuracy: in relation with the plot number – +/-50% to +/-5%..

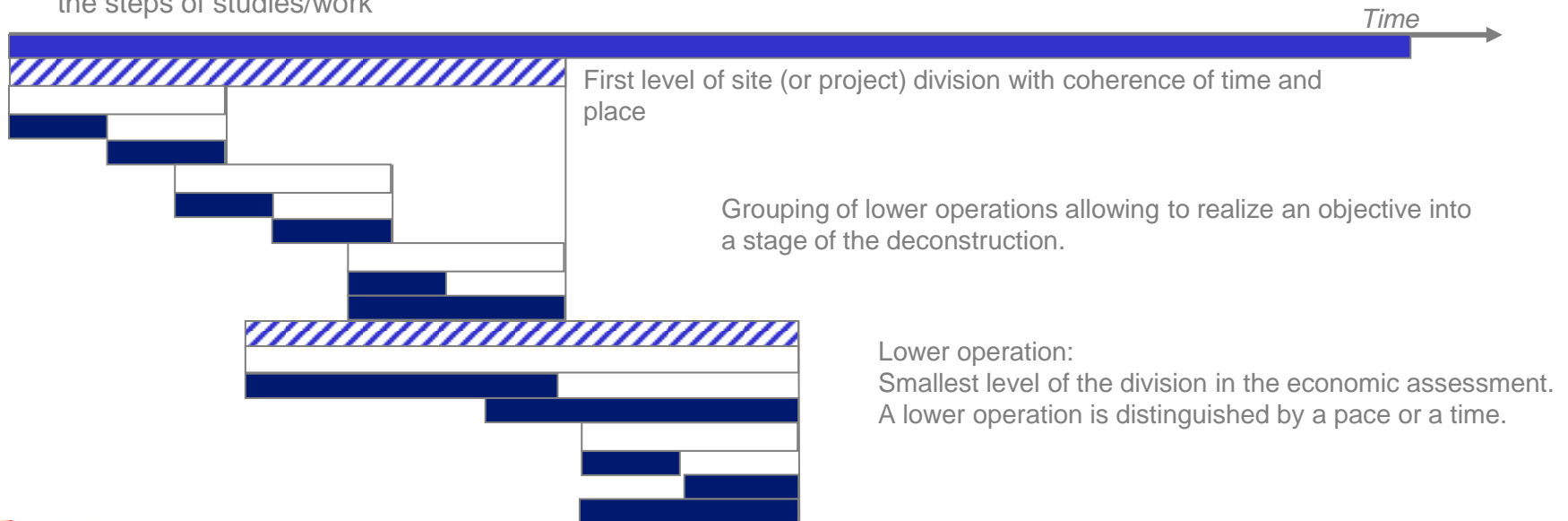


ANALYTICAL METHOD: BOTTOM UP

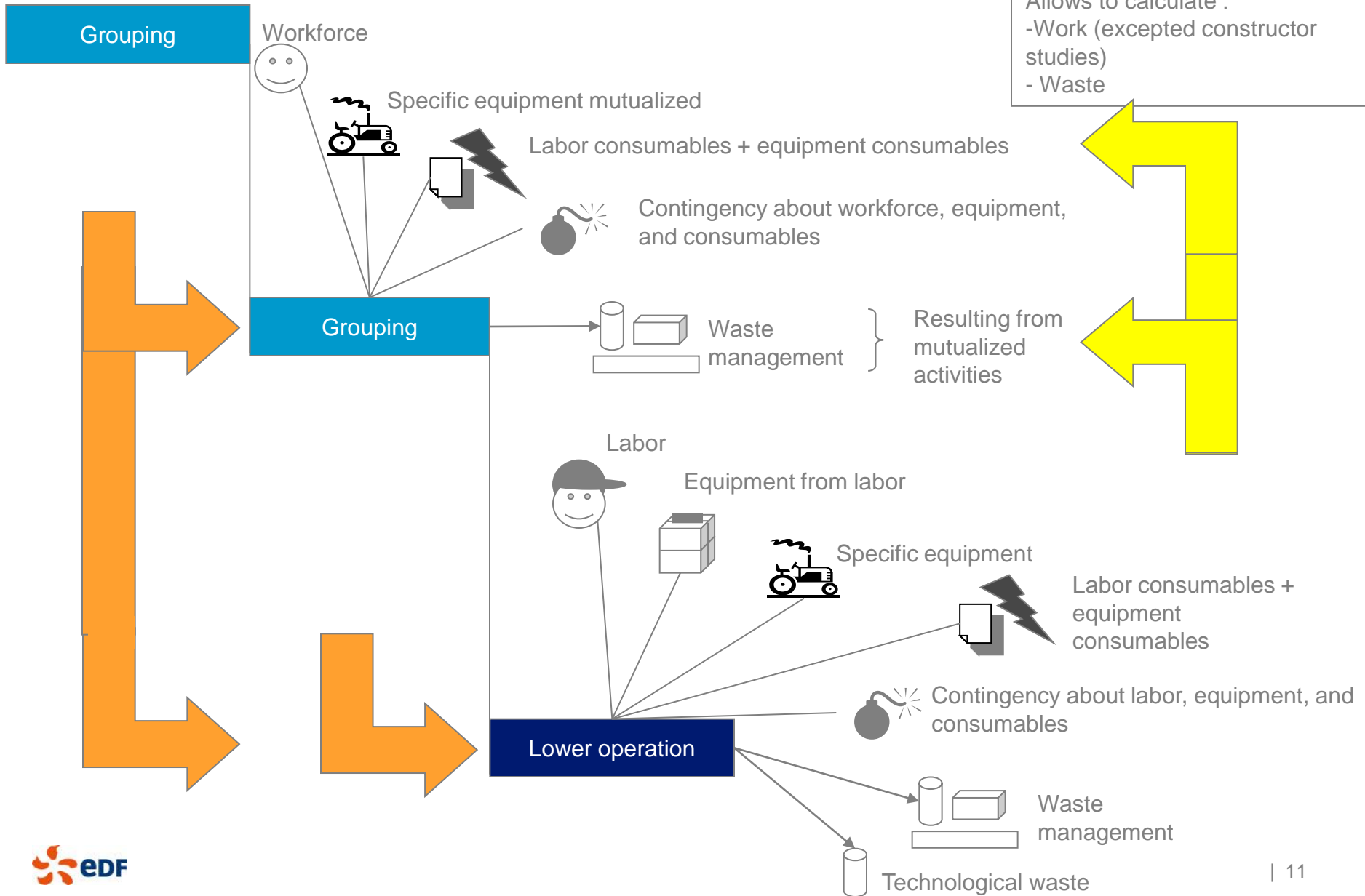
- Association of unit cost factors with lower operations
- The estimate is obtained by adding the unit costs
- An advanced level of detail is needed, and a good precision of the reference data.
- The estimate has a strong link with the schedule
- **Accuracy : # +/- 5%**

Site :

For a given economic assessment, the site represents all the steps of studies/work



CALCULATION ILLUSTRATION



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EXPECTED FEATURES

REQUIREMENTS

Decommissioning projects needs :

- To modelize a strong link between cost and planning
- To generate cost chronic
- To stretch the costs in time
- To use operation models which embark sequencing of operations
- To authorize the work on a planning
- To simulate a process (to a lower operation, or a grouping of operations)

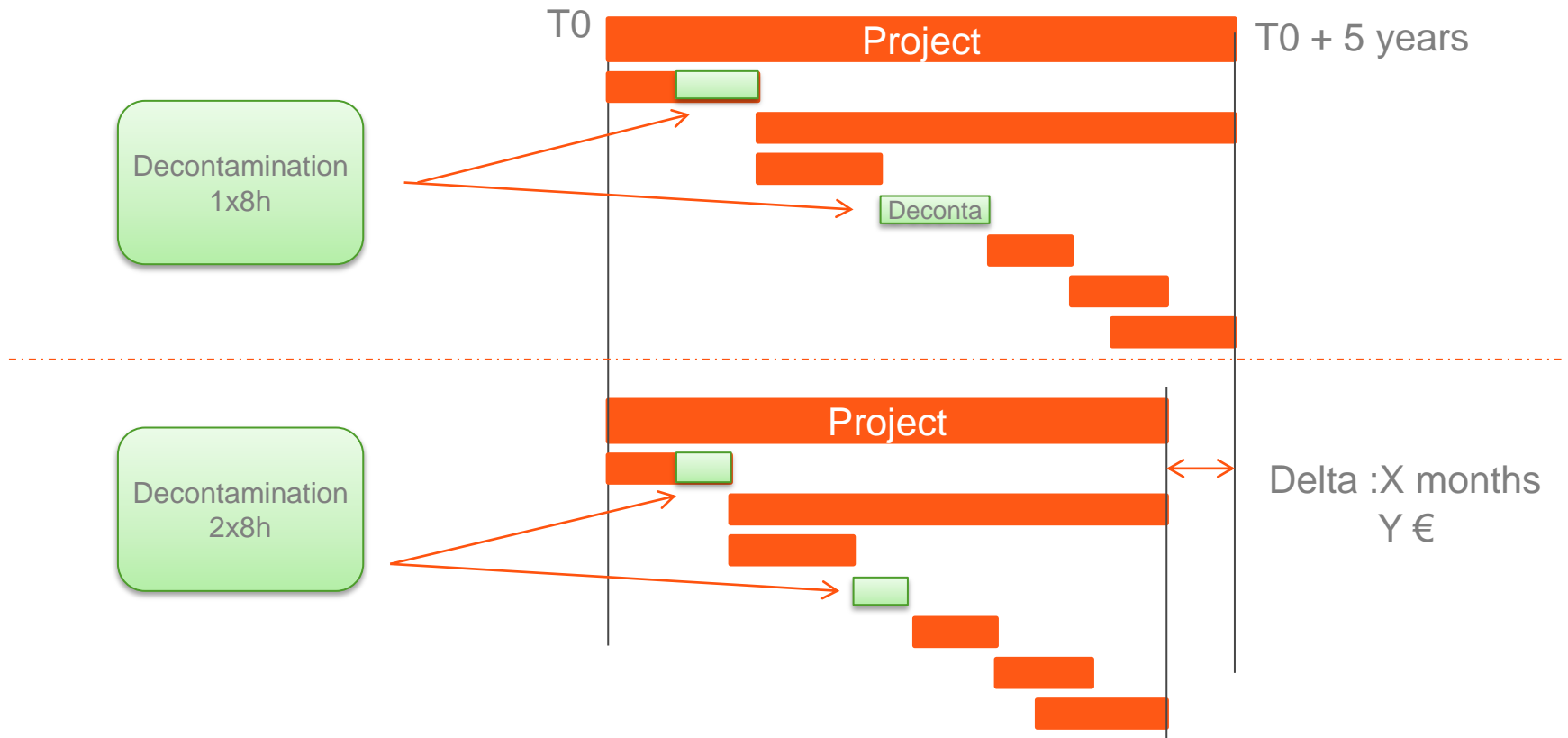
AUDITABILITY

The estimates are audited numerous time. This implies:

- **Transparency about the calculation and data manipulation. All the data manipulation, of all type needs to be perfectly traced and documented, so it can be explained clearly, and illustrated by an easy example.**
- **Traceability on used frame of reference. We need from the cost estimate to have a list of all the frames of reference used in the updated version from the study**
- **Moreover, we need to be able to update these frames of reference and we can be able to choose to integrate these updates, so we can evaluate the impact of the amount of the estimate**

SENSITIVITY ANALYSIS

For instance



BREAKDOWN STRUCTURES: ISDC, WBS, CBS..

The estimates which result from the costing solution has to be able to be decomposed into different structures:

- It has to differentiate and return labor costs, office costs, management cost, equipment costs, waste management costs, operation costs...
- Another structure is the one imposed by the International Structure for Decommissioning Costing (ISDC). It is detailed on the website of NEA. ISDC specifies:
 - The Work Breakdown Structure (WBS) until level 3
 - The Cost Breakdown Structure (CBS) at level 1
 - The structure with equipment and material inventory to deconstruct
 - The sequencing of different steps of the projects in which the planning has to be registered

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AND THE WINNER IS..

DEPENDENDING OF THE LEVEL OF DETAIL

Cost estimator always uses and mixes several methods.

- Different levels of detail
- Different timescales
- Different financial weights

What about the associated uncertainties?

- The cost estimator has to take into account uncertainties: associating each unit cost a range of uncertainty adapted to the level of confidence about the amount.
- These uncertainties has to be added into a statistical form, so we can keep a total uncertainty acceptable (MonteCarlo)

Questions?

THANK YOU