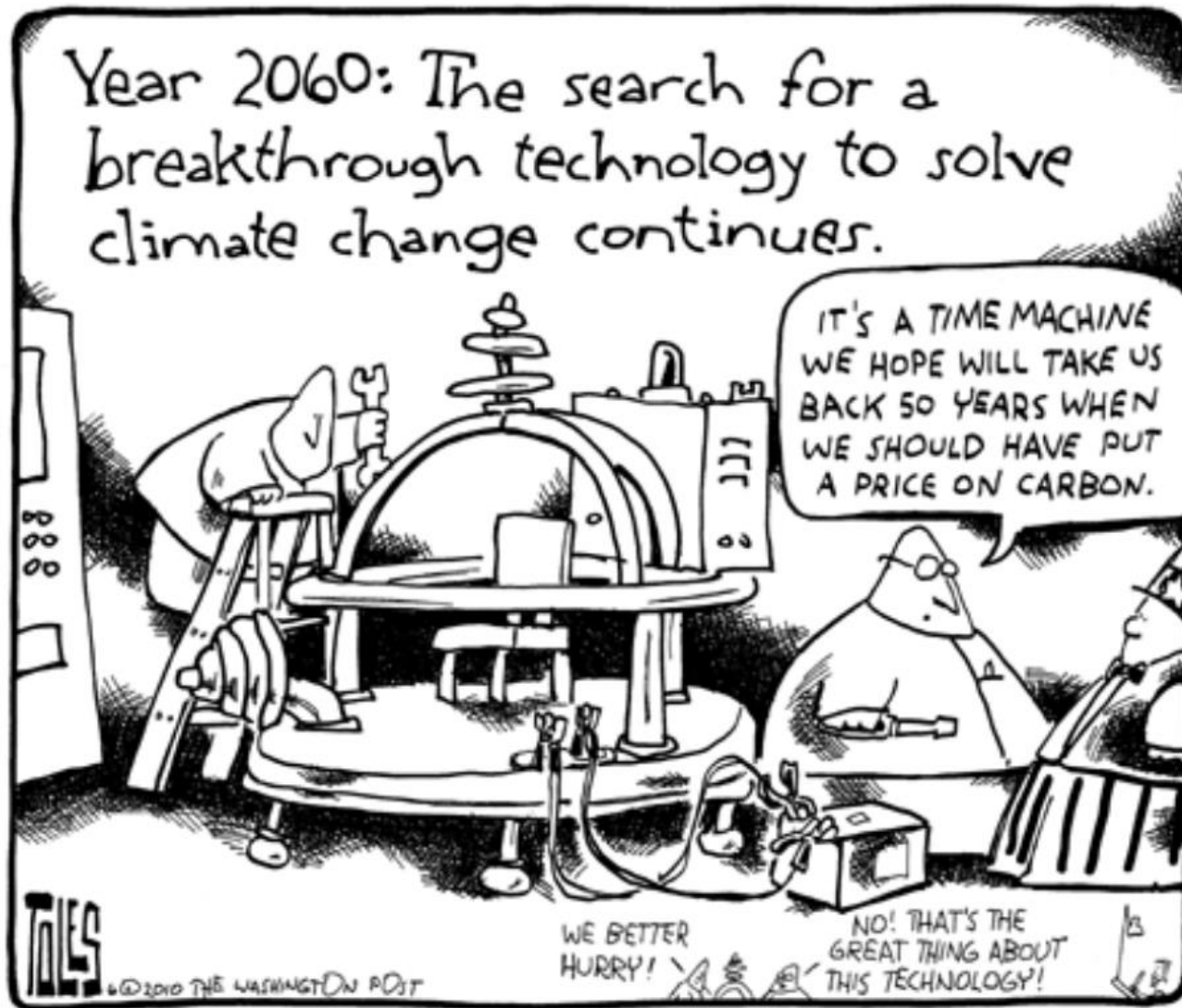


INNOVATION FUND

NER 300 HISTORY

ENERGY AND ENERGY-INTENSIVE INDUSTRIES WORKSHOP
2019

Breakthrough technologies to combat climate change

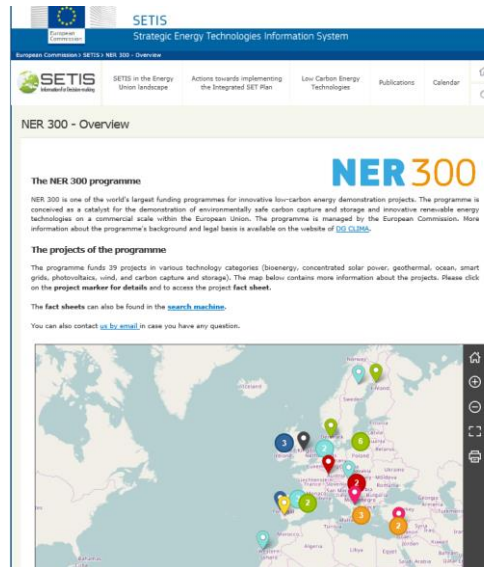


NER300 – A GRANT SCHEME for CCS & Innovative RES

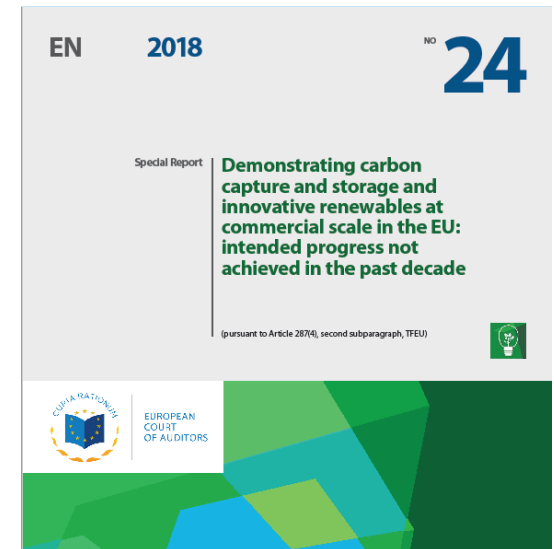
It seems everybody knows NER300 well



https://ec.europa.eu/clima/policies/innovation-fund/ner300_en



<https://setis.ec.europa.eu/NER300>



<https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=47082>

But what did EIB do there? And... Did it finally learn?

Role of the EIB & Tasks in NER300



EUROPEAN COMMISSION

Brussels, 3.11.2010
C(2010) 7499 final

COMMISSION DECISION

of 3.11.2010

laying down criteria and measures for the financing of commercial demonstration projects that aim at the environmentally safe capture and geological storage of CO₂ as well as demonstration projects of innovative renewable energy technologies under the scheme for greenhouse gas emission allowance trading within the Community established by Directive 2003/87/EC of the European Parliament and of the Council

SEC(2010) 1319
SEC(2010) 1320

Article 7 Financial and technical due diligence

The EIB shall perform the due diligence assessment of any proposed project in accordance with specifications laid down in the calls for proposals referred to in Article 5(1) and shall cover at least the following aspects:

- (1) technical scope;
- (2) costs;
- (3) financing;
- (4) implementation;
- (5) operation;
- (6) environmental impact;
- (7) procurement procedures.

³ OJ L 184, 17.7.1999, p. 23.

EN

8

EN

Article 8 Project selection

1. Eight projects falling under Part A.I of Annex I and one project in each project sub-category specified in Part A.II of Annex I shall be funded.

However, where resources allow, further projects may be funded while maintaining the balance between CCS and RES demonstration projects.

Where no more than two proposals are submitted in a given sub-category, the Commission shall assess the possible impact of the limited number of proposals on the competition for selection under this Decision, and may, where appropriate, decide to postpone award decisions in the relevant sub-category to the second round of calls for proposals.

2. Projects shall be ranked in order of increasing cost-per-unit performance. CCS demonstration projects shall be ranked as a single group. RES demonstration projects

- (8) In light of its expertise in project selection and financing, the Commission has sought to involve the EIB in the implementation of this Decision. The EIB has agreed that, acting on request of, on behalf of and for the account of the Commission, it should perform certain tasks in respect of the project selection, the monetisation of allowances and the management of the revenues. The specific terms and conditions of the co-operation, including remuneration of the EIB, should be laid down in an agreement between the Commission and the EIB, subject to the approval of the decision-making bodies of the EIB. The EIB should be reimbursed for the performance of those tasks from income generated from its management of the revenues.

Article 4 Role of the EIB

The European Investment Bank (EIB) shall perform its tasks under this Decision on request of, on behalf of and for the account of the Commission. The Commission shall be responsible with regard to third parties.

Article 10 Monetisation of allowances and management of revenues

1. For the purposes of monetisation of allowances and management of revenues, the Commission shall act on behalf of Member States.
2. The Member States and the Commission shall ensure that the 300 million allowances referred to in Article 2(1) shall be transferred to the EIB for monetisation and management of the revenues.
3. The EIB shall sell the allowances for the first round of calls for proposals before the award decisions are adopted by the Commission for each round of calls for proposals referred to in Article 5(1).

The EIB shall manage the revenues and shall pass them to Member States as required for disbursement pursuant to Article 11.

EN

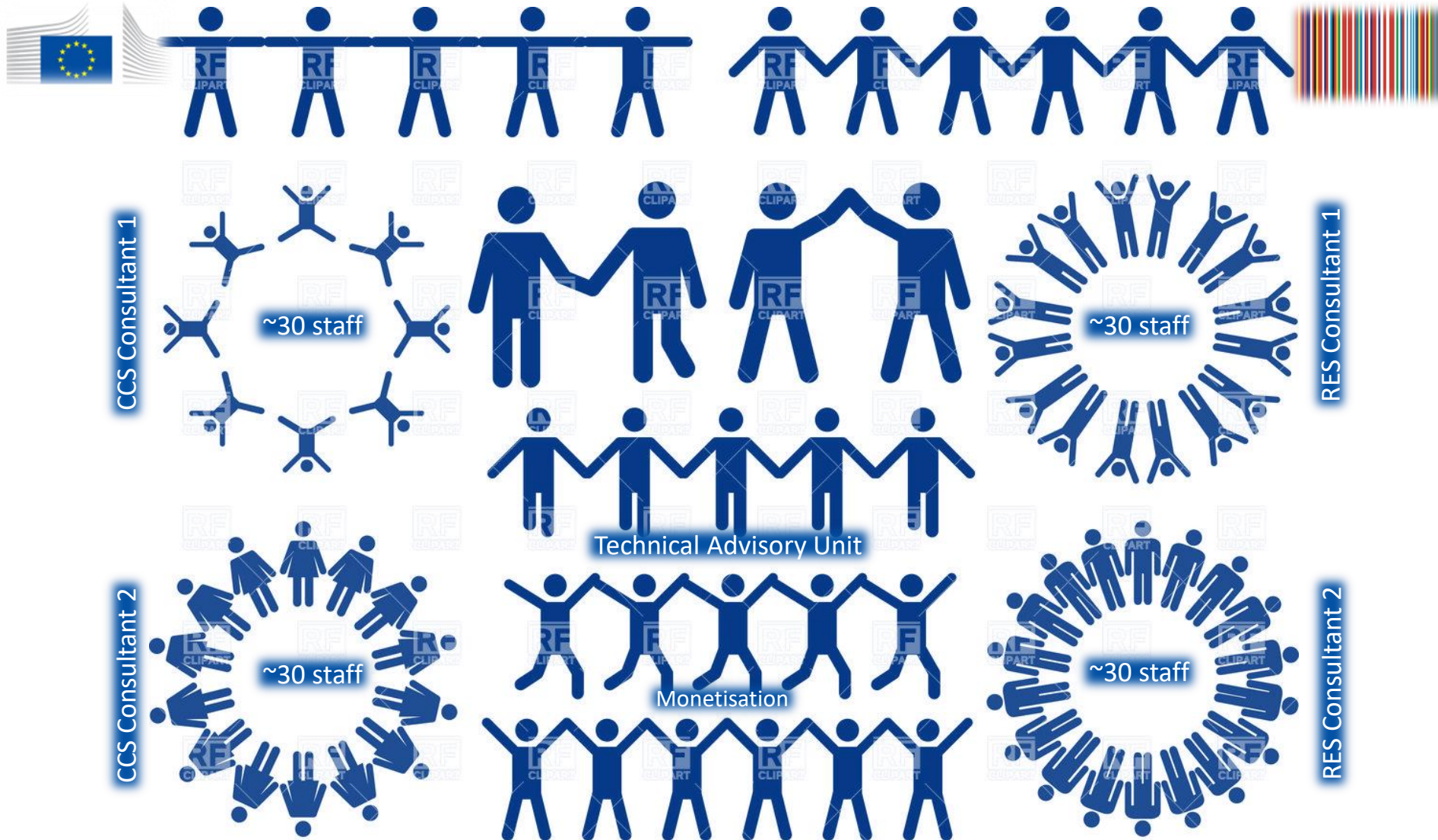
10

EN

Article 11 Disbursement of revenues and use of non-disbursed revenues

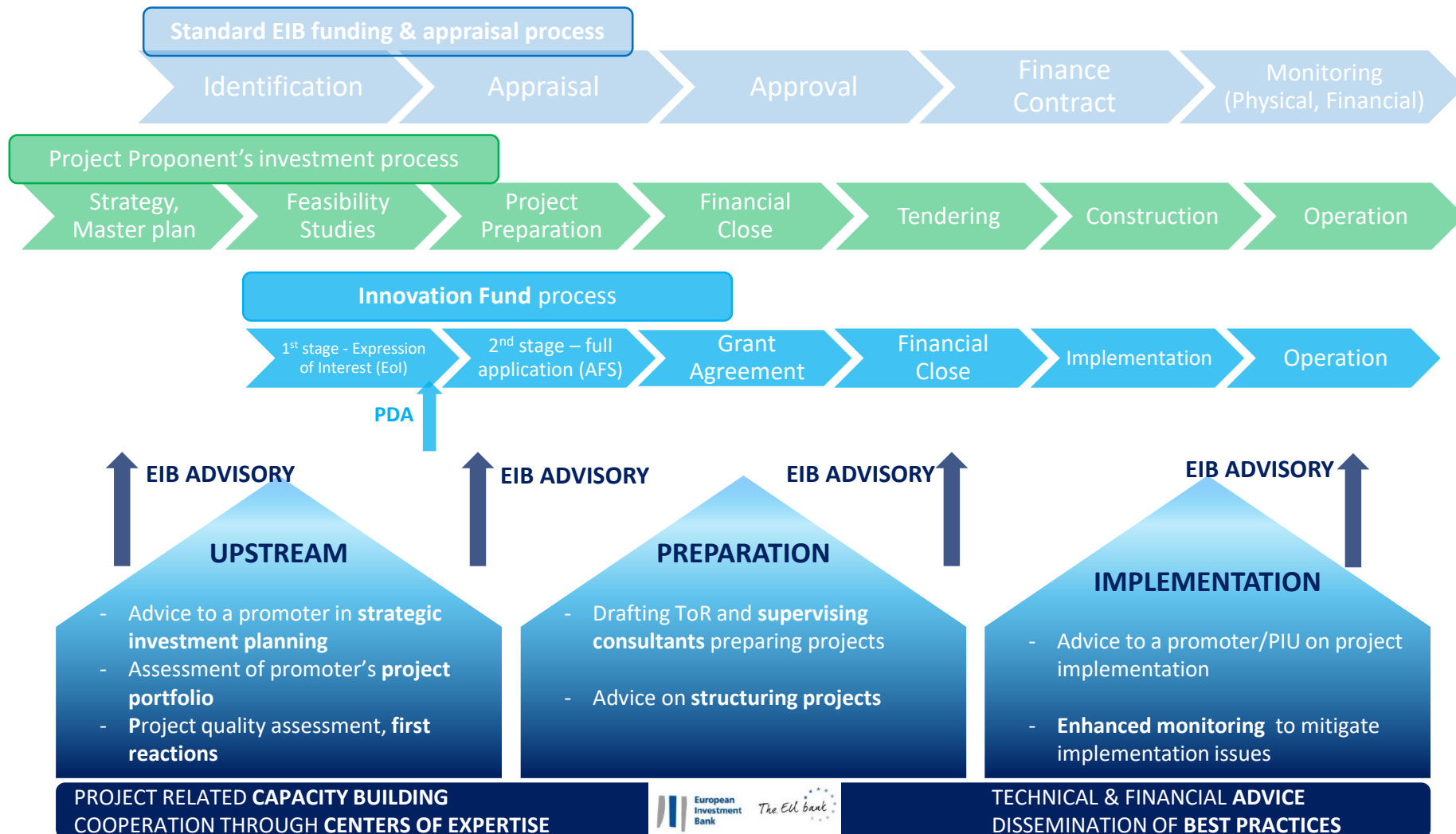
1. Member States shall disburse the revenues to project sponsors on the basis of legally binding instruments which shall set out at least the following:
 - (a) the project and the awarded funding in euro;

Implementation within and by the EIB



Project Evaluation - EIB's Value Added

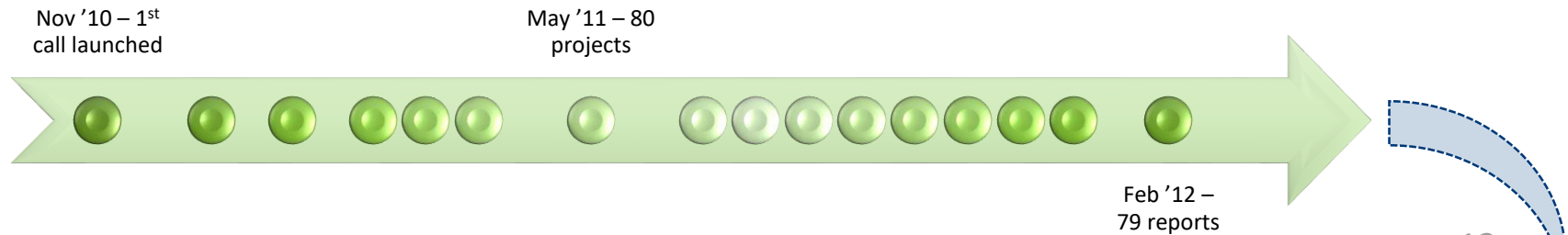
Extensive **expertise in financing and supporting** complex infrastructure projects and their investors **throughout the project cycle**



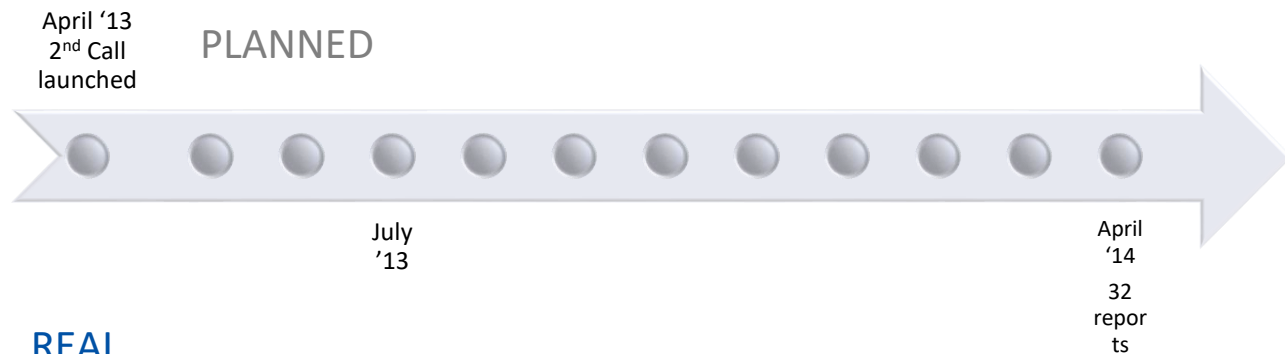
AFS = Application Form Sheets

TIMELINE AND MILESTONES

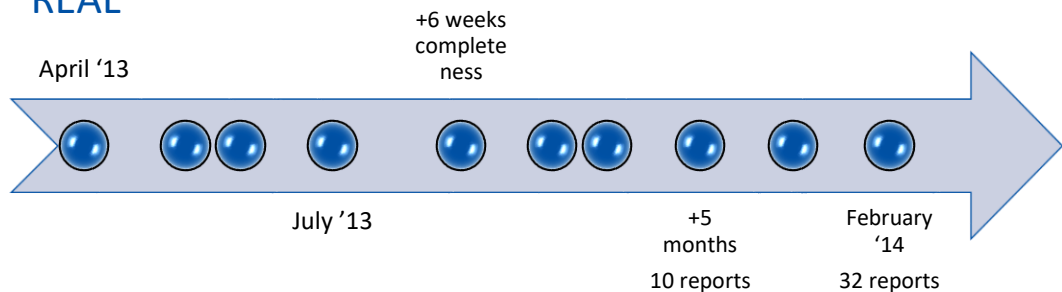
1st Call: ~80 projects in May 2011



2nd Call: 33 projects in July 2013:



REAL



SOME CONCEPTUAL CHALLENGES

Existed already at the time of NER300.....

- ▶ RELEVANT COST
- ▶ REFERENCE PLANT

... but there were many others

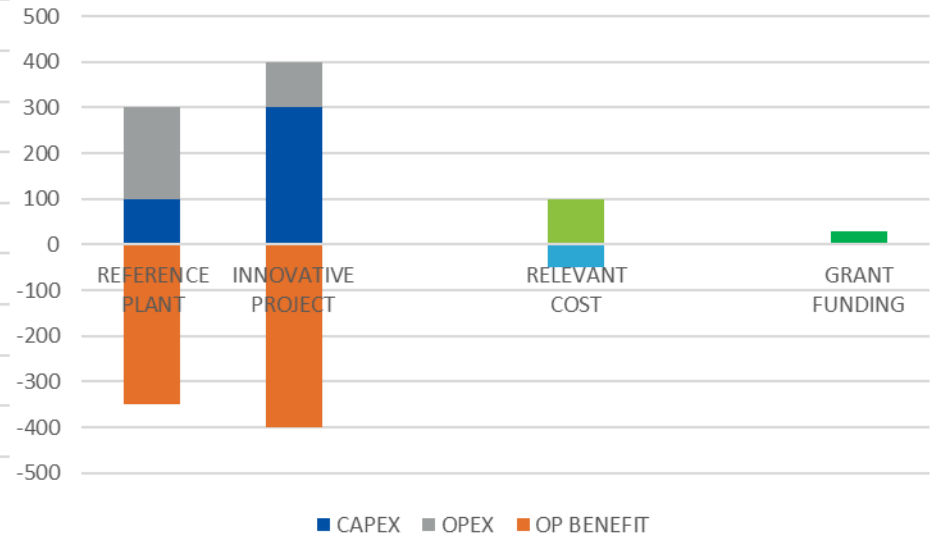
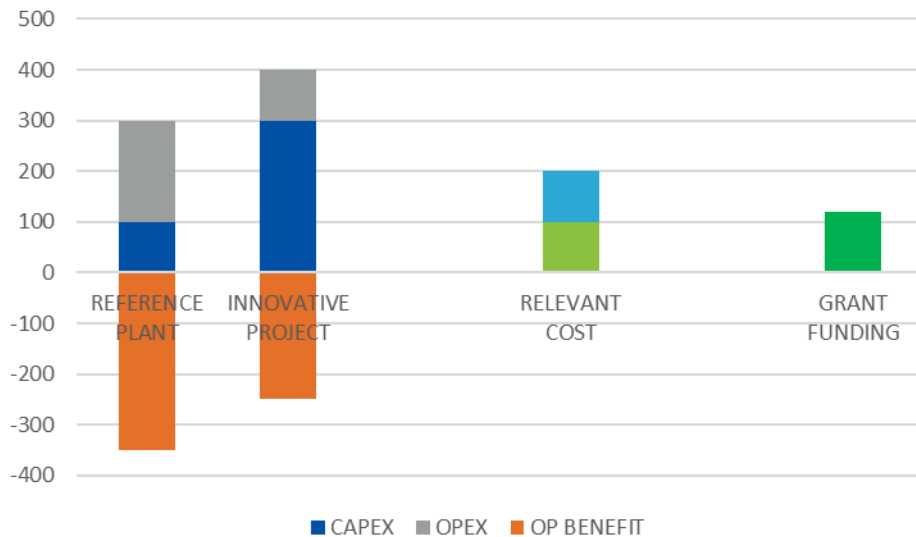
RELEVANT COST

Funding was in principle $\leq 50\%$ of extra investment and operating costs for demonstration (“Relevant Cost”)

Relevant Cost (RC):

For CCS: $RC = CAPEX \text{ of CCS element} - NPV_{10\text{years}} (OPEX + BENEFITS^{1})$

For RES: $RC = CAPEX \text{ OF innovative RE element} - NPV_{5\text{years}} (OPEX + BENEFITS)$



RELEVANT COSTS - CHALLENGE AND OPTIONS

CHALLENGE:

- ▶ What could be the comparable ‘conventional production’?
 - ▶ thermal, fossil-fuel power generation for electricity
 - ▶ wholesale refinery cost including margin for biofuels
 - ▶ Commercially mature renewable technology
- ▶ Environmental State Aid Guidelines (EAG)
 - ▶ “reference investment” : technically comparable investment that provides a lower degree of environmental protection and that would credibly be realised without aid

OPTIONS NER300:

- ▶ Fossil-fuel based technologies for all RES
- ▶ Commercially mature renewable technologies for all RES

REFERENCE PLANT

Challenge - Range of options



- ▶ How many reference plants are necessary?
 - ▶ Generic or project specific
 - ▶ 34 RES sub-categories x 27 Member States?
 - ▶ MS expressed the need for a “level playing field”, which would suggest to use 1 single reference plant

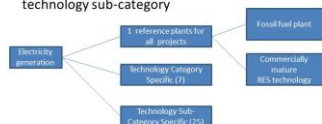
Reference Plants in the NER 300 process

Meeting with Member States 10th January 2010

Overview

RES sub-categories generating electricity

- CSP, PV, Geo, Wind, Ocean, Hydro & 3 bioenergy project sub-categories
- 3 potential approaches by a MS
 - 1 reference plant for all technologies
 - 7 reference plants: 1 for each technology category
 - 25 reference plants (theoretically possible): 1 for each technology sub-category



Key issues – worked examples

Approach which may offer a “level playing field” for MS

- 1 reference plant for all electricity generating RES technologies- examples:
 - Option 1: Combined Cycle Gas Turbine, or
 - Option 2: commercially mature renewable technology

Reference Plant – electricity generating Methodology and assumptions

Methodology:

- 1. Determine type of Reference Plant in relation to RES project; i.e. load characteristic
- 2. Choose cost and other (technical) factors at a reasonable level
- 3. Calculate full cost (EUR/MWh) of Reference Plant as a proxy for its revenues

Basic assumptions needed for a Reference Plant:

- Capex (EUR/kW), Opex (% of Capex), fuel prices (e.g. aligned with fuel price forecast of international institutions, such as IEA), carbon price (e.g. at current ECX levels), load factor (% or hours/year)
- Determine on that basis Relevant Cost of RES project, adjustment of capacity and production of RefPlant to RES project through factoring in the ratio of load factor

Worked example 1 - Combined Cycle Gas Turbine

Key assumptions (illustrative only)

- 860MW, 70% load factor
- ~€600 / kW installed capacity; total capex: €558m
- Annual generation: 5,273,520 MWh
- 350kg/MWh CO₂, €15 / tCO₂ cost
- O&M €24/KW/yr (or ~3.5% capex)
- Fuel €7/GJ Fuel cost at 70% load factor
- Other €9/kW/yr (staff, administrative and insurance costs)

(Detail to be provided in Submission Form 4)

Sensitivity Analysis

- Define innovative project (offshore wind)
- Calculate relevant costs using CCGT and onshore wind as reference plants
- Assess sensitivity of relevant costs to changes in key variables

Key Parameter	Sensitivity of relevant cost to:	
	CCGT reference	Onshore wind reference
Capital Cost	medium	high
O&M	low/very low	low
CO ₂ price	low	n.a.
Gas price	low	n.a.
Generation	n.a.	medium

Worked examples – comparison

CCGT:

- Greater consistency across EU in cost information for CCGT
- Level playing field when evaluating CPUP
- Costs are lower relative to onshore wind giving higher relevant costs, projects hence to receive more financial support from NER 300
- Similar approach used so far in ENV State aid guidelines
- CPUP for RES projects appears reasonable and indicates competitiveness

Onshore wind:

- Cost data for wind projects uncertain/ variable
- No level playing field when evaluating CPUP
- Costs are higher relative to CCGT giving lower relevant costs, projects hence to receive less financial support from NER 300

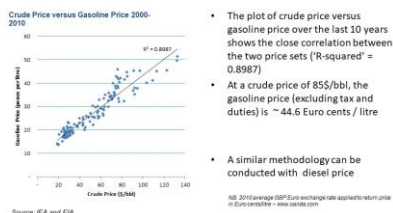
Possible bioenergy reference plants 1/5

Sub-category	Suggested reference plant	Reasoning
B10a: Solid liquid or slurry bioenergy carriers via pyrolysis	Project specific capital equipment identified	No existing facilities at that scale
B10b: Solid liquid or slurry bioenergy carriers via torrefaction	Project specific capital equipment identified	No existing facilities at that scale

Option 1: Fossil Fuel Reference

Option 1 Cost basis	<ul style="list-style-type: none"> Take forward crude curve as base feedstock cost Define typical European refinery and typical product slate Determine capital costs / investment costs (for amortization) Calculate operating costs (e.g. energy, catalyst, manpower, maintenance, etc) Calculate refining margin based on costs Calculate product prices to compare versus 2nd generation biofuels
Option 2 Economic Alternative	<ul style="list-style-type: none"> Take forward-looking crude curve as base feedstock cost Take historic European refining margin – take a view on future long-run margin Infer refinery yield from refining margin Calculate product prices to compare versus 2nd generation biofuels

Regression of crude price against gasoline price



Option 2 – 1st Generation Bioethanol

Key assumptions (illustrative only)

- Ethanol via saccharification / fermentation of wheat
- Production: 150,000 tonnes per year
- Capital cost: €120M
- Annual Operating cost (including feedstock): €123M
- Wheat: €150 / tonne
- Co-product (animal feedstock): 120% of wheat price

(Detail to be provided in Submission Form 4)

Sensitivity Analysis

- Define innovative project (Biomass to Liquids via gasification)
- Calculate relevant costs using gasoline and 1st generation bioethanol as reference plants
- Assess sensitivity of relevant costs to changes in key variables

Key Parameter	Sensitivity of relevant cost to:	
	Gasoline reference	Bioethanol reference
Capital Cost	n.a.	low
O&M	n.a.	low
Wheat price	n.a.	high
Crude price	medium	n.a.

Conclusions biofuels

- MS may compare cost per unit energy of innovative project with gasoline price to determine relevant costs (modify Submission Form 4)
- Gasoline price more consistent across the EU
 - Level playing field when evaluating CPUP
 - Overcome challenge of conventional refinery cost structure
 - Similar approach used so far in ENV State aid guidelines
- Bioethanol costs more sensitive
 - Relevant costs are more sensitive to wheat price than crude price
 - Bioethanol capital costs more variable
- Projects likely to receive more financial support from NER 300 under gasoline price RefPlant

Guidance Session for Member States and Project Sponsors

2nd Call for Proposals

Application Form Structure 2nd CfP

1st Call for Proposals

1. General Information on Project
2. General Information on Project Sponsor
3. Project Summary/Specification
4. Operation Start Date and Implementation
5. Relevant Environmental Assessment and Relevant National Permits
6. Knowledge Sharing
7. Confirmation of location
8. CCVRIS Technical Eligibility
9. Financial Standing of Project Sponsor
10. Technical Scope
11. Costs
12. Financing
13. Risk
14. Operation
15. Project Sponsor Declaration

2nd Call for Proposals

from 15 to 6

AF A: General info of the project (i.e. AF 1, 2, 3, 10, 11, 12, 13, 14, 15)
AF B: Technical (i.e. AF 1.4, 3, 4, 10, 14)
AF C: Financial & Costs (i.e. AF 9, 11, 12)
AF D: Authorisations & Permitting (AF 5, 7)
AF E Risk (AF 13)
AF F: Declarations (AF 6, 8, 15)

Submission Form Structure 2nd CfP

1st Call for Proposals

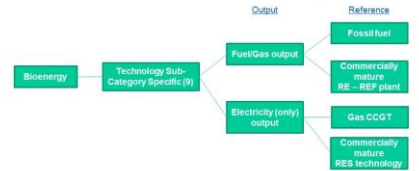
2nd Call for Proposals

SF A Declarations: 1,2,3,10
SF B Eligibility: ECA, 8, 9
SF C Financials: 4,5,7 + Annex C
SF D Performance: 6

|| Bioenergy Projects:

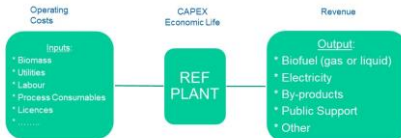
Overview of Sub-Categories

- 9 sub-categories with different outputs
- Products/Output: electricity, gaseous and liquids, solid energy carriers



Reference Plant

Bioenergy Projects: Costs and Revenue Streams



Reference Plant option:

1st Generation Bioethanol Plant - Scaling

- Reference Plant input parameters (CAPEX, OPEX, OP-Benefits need to be scaled to the size of the RES project in terms of the (eligible) renewable energy output capacity and the load factor:

$$\text{Scaling Factor} = \frac{\text{Capacity (5y)}_{\text{RES}} \cdot \text{LFRES}}{\text{Capacity (5y)}_{\text{REF}} \cdot \text{LFREF}}$$

RES Project (69 MI p.a.; LF=0.8)

Investment Cost (€) - Project	120
NPV Operating Costs (€) - Project	126
NPV Operating Benefits (€) - Project	189
Performance (MWh, 5 year)	1604

Reference Plant (scaled@0.44):

Reference Plant (LF=0.9)

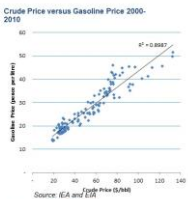
Investment Cost (€)	97
NPV Operating Costs (€)	375
NPV Operating Benefits (€)	457
Performance (GWh, 5 year)	3645

Investment Cost (€) – REF	43
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Note: NPV over first 5 years of operation; LF = Load Factor

Reference Plant option:

Fossil Fuel Price Reference (FFPR)



- The plot of crude price versus gasoline price over the last 10 years shows the close correlation between the two price sets ('R-squared' = 0.9987)
- At a crude price of 85\$/bbl, the gasoline price (excluding tax and duties) is ~ 44.6 Euro cents / litre
- A similar methodology can be conducted with diesel price

Details of RefPlant to be provided in AF C, Annex C.2 and SF C

Reference Plant option:

Fossil Fuel Price Reference (FFPR)

Calculation of the Relevant Cost (RC):

$$RC = \left(PUCRE \left(\frac{EUR}{MWh} \right) - FFRP \left(\frac{EUR}{MWh} \right) \right) * Performance \ 5 \ years \ (MWh)$$

Definitions:

- **PUCRE:** Discounted per unit cost of energy over Economic lifetime of the RES Plant
- **FFRP:** Fossil Fuel Reference Price in EUR/MWh
- **Performance over 5 years:** Accumulated performance of the RES plants in its 1st five years of operation (NER300 period)

|| Calculation of CPUP and TRPF

$$CPUP = \frac{\frac{TRPE}{[RC - OC]} + NPV(\text{Additional Benefits, 5 years})}{\text{Performance (MWh, 5 years)}}$$

Definitions:

- **NPV Additional Benefits:** resulting from support schemes even if they do not constitute State Aid within the meaning of Article 107(1) of the Treaty, avoided costs and existing tax incentive measures (article 3.5 of the NER300 Commission Decision).
- **TRPF:** Total Request for Public Funding, i.e. sum of all contribution from (direct) public sources envisaged to be provided for a project, such as funding from NER300, national sources, State Aid in terms of investment aid, and:
 - **TRPF – RC = Operator Contribution (OC)**
 - the NER300 contribution is fixed at 50% of RC (unless TRPF is less than 50% of RC, in which case NER300(1) applicable, combined with EEPRI) covers the TRPF; (Recital 6 and Art. 2 3rd sub-para of the NER300 Commission Decision)

SUMMARY OF LEARNING POINTS

FROM EIB'S PERSPECTIVE

- ▶ NER300 as a concept works in principle, notably in times of financial crisis
- ▶ Needs flexible governance structure with clear accountabilities and ownership
- ▶ Many low-carbon innovations deserve public support to be demonstrated in the coming decade
- ▶ Economic and bankability assessment is decisive
- ▶ Continuous support of all stakeholders needed
- ▶ EIB can manage such funds as a one-stop-shop EU entity

TYOLOGY OF POSSIBLE FINANCIAL SUPPORT VS RISKS/BANKABILITY

