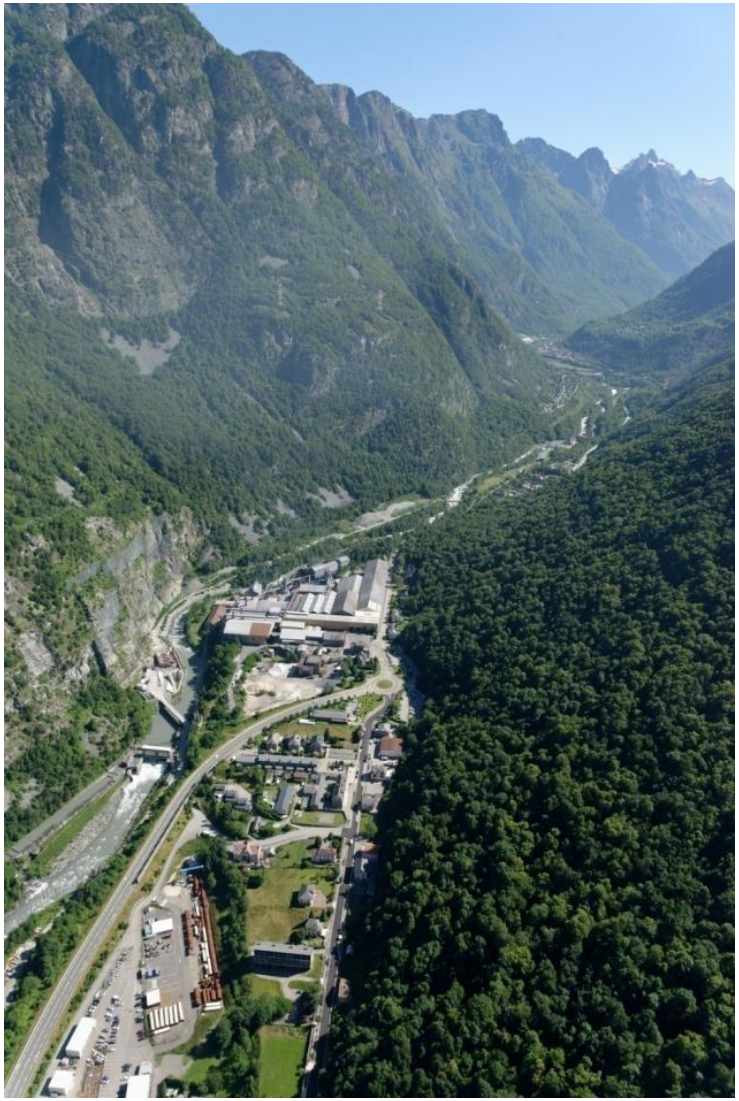
Green Bond investors and stakeholders site visit

"Chantier Romanche Gavet"

A new hydroelectric scheme on the Romanche River



Agenda

09:45 – 11:15 Transfer to Gavet site
Introduction by EIB IR team and EDF Corporate teams

11:15 – 12:30 Presentation of the project by EDF local project managers & discussion

12:30 – 15:30 Site visit (possibly in 2 separate groups)

- Safety briefing and equipment *(over a quick lunch)*
- Visit of the water intake site upstream
- Visit of the underground power station site downstream

15:30 – 17:00 Transfer to Lyon airport
Discussion on project benefits and reporting with EIB IR team, EDF Corporate teams and Natixis

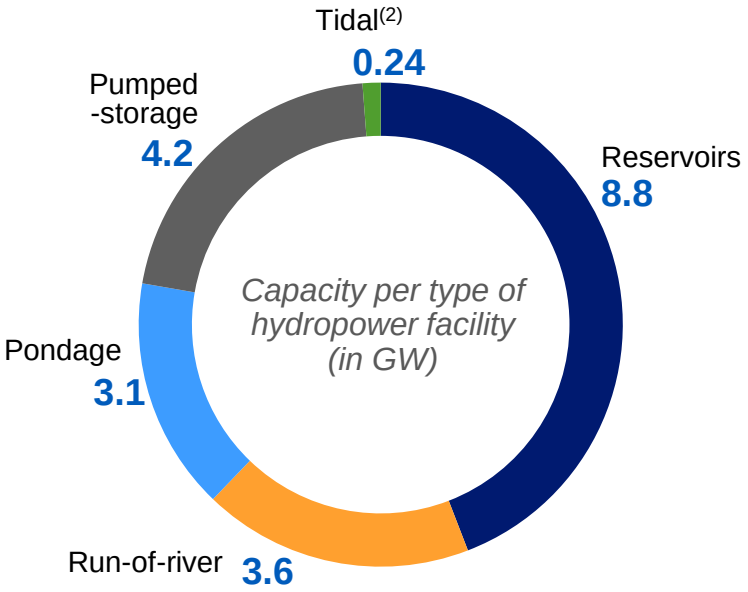
EDF Green Bonds: equivalent of €4.5bn issued, in 5 tranches and 3 currencies

Issue date[(1)]	Maturity *(in years)*	Nominal amount *(millions of currency units)*	Currency	Eligible investments in the use of funds		Allocated funds as of 31/12/16
				Construction of new renewable capacity by EDF EN	Renovation and modernization of existing hydroelectric facilities in metropolitan France	
11/2013	7.5	1,400	EUR	✓		100%
10/2015	10	1,250	USD	✓		97.6%
10/2016	10	1,750	EUR	✓	✓	-
01/2017	12	19,600	JPY	✓	✓	-
01/2017	15	6,400	JPY	✓	✓	-

(1) Date of funds reception

EDF's hydropower fleet in mainland France

- EDF's hydropower fleet in mainland France comprised of **433 power plants** with an average age of **72 years**
- Around **21GW of installed capacity**
  - Of which close to 14GW can be dispatched instantly
- **Total output in 2016 = 42.4TWh(1)**
- Benefits of hydropower
  - Dispatchable renewable generation
  - Speed, availability and flexibility
  - Contribution to management of supply and demand balance in a context of growing share of intermittent generation
  - Ability to provide ancillary services to the network (frequency and voltage adjustments)
  - Water storage capacity (peak energy, cold source for thermal and nuclear generation)



≈20% of the overall generation capacity in France

(1) Total net output adjusted for the electricity consumption for the running of the energy transfer pumping stations (« STEP ») is of 35,8TWh in 2016
(2) The tidal power plant of the Rance generates electricity by using the up and down movement of the tides

In September 2016, EDF extended its Green Bond Framework to investments in hydropower assets modernisation and upgrade

- Green Bond funding became available to investment activities that will enable hydropower generation facilities in mainland France to:
  - sustain a high level of generation efficiency and operational safety,
  - adapt to future changes in climate patterns, to increase their renewable electricity output, and
  - respond to enhanced flexibility needs to balance the growing share of intermittent renewable generation
- This addition further expands an already strong pipeline of Green Bond eligible investments
  - **~€1bn per year:** eligible investments in new wind and solar projects by EDF EN
  - **~€300m per year:** eligible investments in hydropower assets managed by EDF's Hydro Division

This Framework builds on the structure developed for EDF's past Green Bond issuances under which EDF committed to, and delivered, high levels of transparency and external scrutiny on all four components of the ICMA Green Bond Principles

EDF mainland France Hydro Projects eligible to Green Bond financing

Investments in existing hydropower facilities in mainland France (excluding subsidiaries)

- Renovation and upgrade of hydropower generation facilities
- Modernisation and automation of existing hydropower facilities' maintenance and operation
- Hydropower development projects

Improve hydropower generation efficiency and safety	Improve resilience to climate change	Increase generation flexibility and ability to manage growth in intermittent renewables	Net increase of hydropower output and/or storage capacity (for pumped storage)

Fulfilling E&S criteria

- French Hydro Project E&S criteria cover five E&S aspects
  - Development of sustainable human resources practices and processes
  - Management of environmental impacts
  - Protection of employees and contractors workers' health and safety
  - Promotion of responsible contractors relationship
  - Dialogue with local players

Inspired by the IHA Protocol's philosophy

ROMANCHE GAVET PROJECT → BUILDING OF A NEW SCHEME ESSENTIALLY UNDERGROUND INSTEAD OF THE 6 EXISTING UNITS

A MORE EFFICIENT SCHEME : + 40% outputs

- 2 Francis Units 2 x 46MW (270m gross head)
- Generation ≈560GWh, the average consumption of 230,000 residents

A SAFER SCHEME

A BETTER INTEGRATION
IN THE ENVIRONMENT

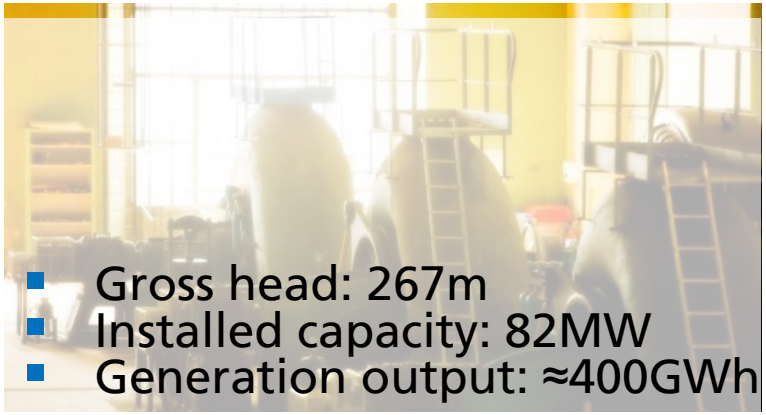
- Balance between reinforced uses in this narrow valley

A SCHEME CONSISTING OF :

- a dam / inlet structure in Livet
- a headrace gallery 10 km long in the massif of Belledonne
- an underground power station in Gavet

A MORE EFFICIENT SCHEME

Existing schemes

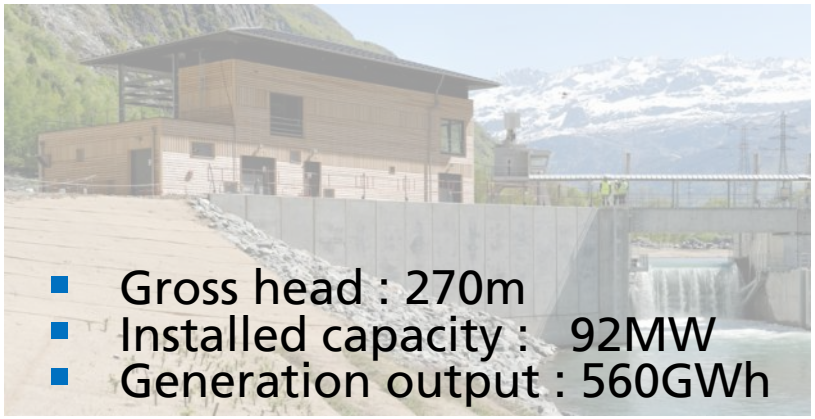


- Gross head: 267m
- Installed capacity: 82MW
- Generation output: ≈400GWh

Matching equipment

- 5 water intakes
- 3 galleries / total length: **3,727m**
- 3 headrace channels / total length: **1,225m**
- 12 penstocks / total length: **7,467m**
- 9 buildings
- 26 units

New scheme



- Gross head : 270m
- Installed capacity : 92MW
- Generation output : 560GWh

Matching equipment

- 1 water intake
- 1 headrace gallery **9.4 km (dia: 4.7m)**
- 1 underground surge shaft: **180m high**
- 1 pressure shaft: **163m high**
- 1 underground power plant with 2 x 47MW Francis units **47MW**

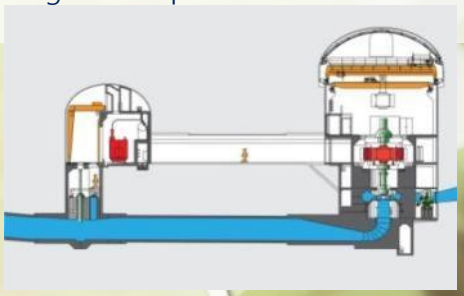
Chantier RomancheGavet

PROJECT DESCRIPTION

Vertical structures
Surge shaft: H180m x D4.8m
Steel-lined pressure shaft : H163m x D3.3m
Raised with a raise drill

Headrace Tunnel
L 9.3 km x D 4.7 m
Muck = 250.000m³
Dug by two tunnelling boring machines

Underground Powerstation
Unit Cavern : 74m x 16m x [25 to 35m]
Transformers Cavern: 64m x 11m x 15m
Muck = 60.000m³
Dug with explosives



Intel structures
- A gate-structure dam
- A water intake structure

3 gates, each 10m wide

Outlet structures
100m long
Energy Dissipators

EDF Green Bond mainland France hydro projects
Project selection, reporting and verification

Project selection

Based on project assessment by **EDF's Hydro Division teams** in charge of project development, procurement and sustainable development.

Reporting

~Quarterly

- Total amount of proceeds allocated to selected Eligible Projects (+ share vs. total raised and unallocated balance)
- Distribution of the total allocated amount by Eligible Projects categories and geographies
- Number of projects having received Green Bond funding

Annual

- Description of most representative projects that received Green Bond funding
- For each Green Bond issue, aggregated impacts:
  - ✓ For development projects: additional generation capacity; expected output, and expected avoided CO_2 emissions
  - ✓ For all other EDF Hydro Division Eligible Projects: generation capacity impacted by investments, expected output, and qualitative description of associated environmental benefits

Annual attestation report from Deloitte

- Alignment with Green Bond Principles
- Compliance with EDF Green Bond Framework on the following aspects:
  - ✓ Project selection process and eligibility of Green Bond-funded projects
  - ✓ Tracking of the funds raised and reconciliation of amounts of funds allocated
  - ✓ Compliance of avoided CO_2 emissions reported with calculation methodology

Deloitte.

EDF contemplated reporting data on Romanche-Gavet project

Total capacity	Additional capacity	Total output	Additional output
92MW	10MW	560GWh/yr	155GWh/yr

- Avoided CO_2 emissions from additional output will be provided, based on:
  - Average emission factor per kWh of the electric system based on the energy mix and life cycle analysis emission factors of each generation technology
  - Emission factor of the project based on LCA emissions of hydropower plant upgrades (work in progress on this factor)
- Under consideration
  - Should EDF report on avoided CO_2 emissions from the renovation of the existing capacity?
    - SNCF Réseaux has developed an approach to calculate avoided emissions from the maintenance and upgrade of existing rail lines
  - How to report on other environmental benefits such as restoration of ecological continuity and biodiversity conservation?