

THE FOUR DIMENSIONS OF THE CIRCLE: A HOLISTIC PATHWAY FOR ENERGY TRANSITION

DECOMMISSIONING, A KEY STEP IN BRIDGING THE GAP BETWEEN THE OLD AND THE NEW ENERGY

Enlit Europe 2021



Today's Session

DECOMMISSIONING PRESENTATION

- The energy transition and its implications
- Decommissioning: gap or bridge?
- The decommissioning challenges
- A holistic solution

ENEL GREEN POWER

- Boosting Circular value chain for renewable asset end of life management

VGB POWERTECH E.V.

- A holistic approach to end-of-life strategies – repurposing of plants

THE PANEL DISCUSSION

THE SPEAKERS

Julien S. Halfon

Head of Pensions and Corporate
Solutions,
BNPP Asset Management

Irene Fastelli

Head of Innovation
Factory
Enel Green Power

Dr. Oliver Then

Executive Managing Director,
VGB PowerTech e.V.

**Catharina Hillenbrand Von Der
Neyen**

Head of Research, Managing
Director
Carbon Tracker

SESSION CHAIR

Ruediger W. Koenig

Independent Executive Advisor

A Global challenge

THE OLD ENERGY SYSTEM WILL BE REPLACED – WITHIN THE NEXT 20 YEARS:

To build an entirely new and very different system on top of an old ...
... means removing the old to make space for the new ...

A MULTI-TRILLION DOLLAR CHALLENGE

on top of

A MULTI-TRILLION DOLLAR CHALLENGE

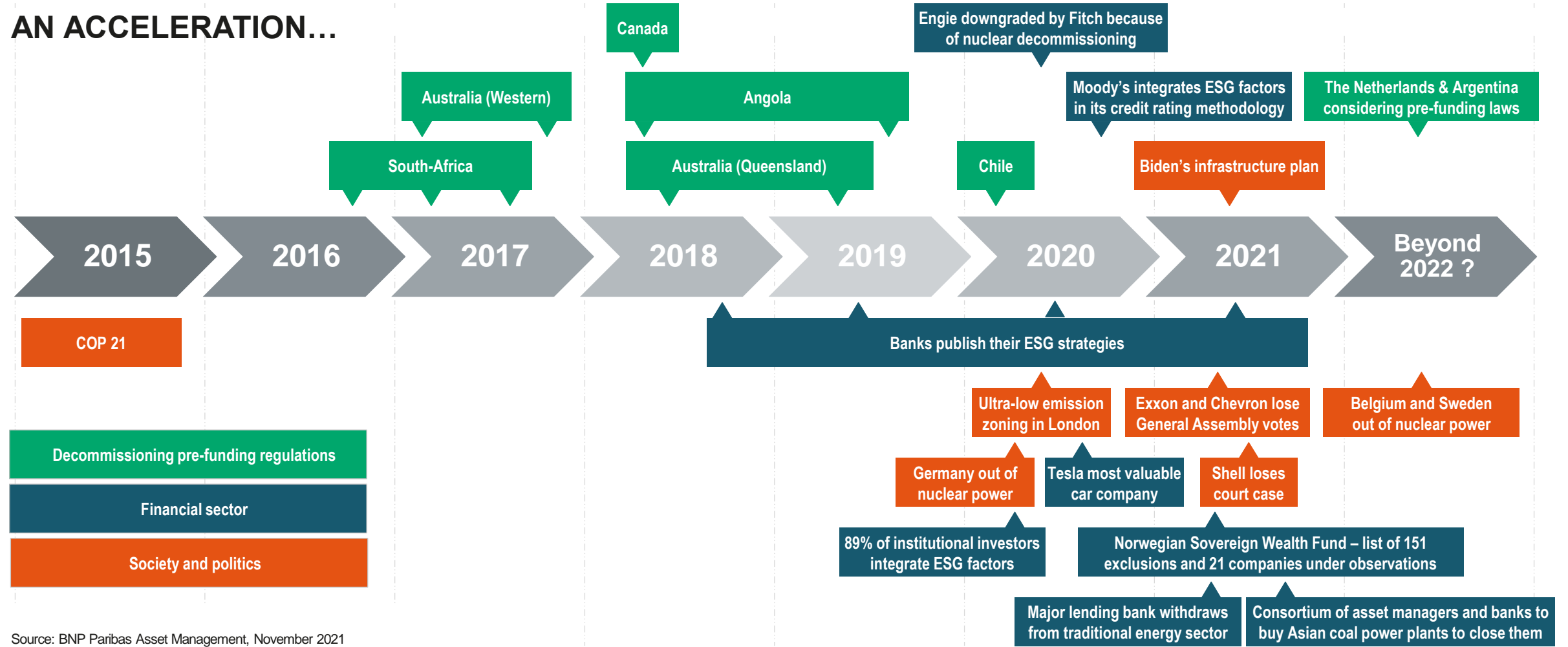


Today we want to discuss: (detached from CO-2, PJ, TWh, Hz, etc.)

What does decommissioning as a key phase in this system transition mean as a holistic challenge to our industry, society, and the institutions involved?

The Energy Transition

AN ACCELERATION...

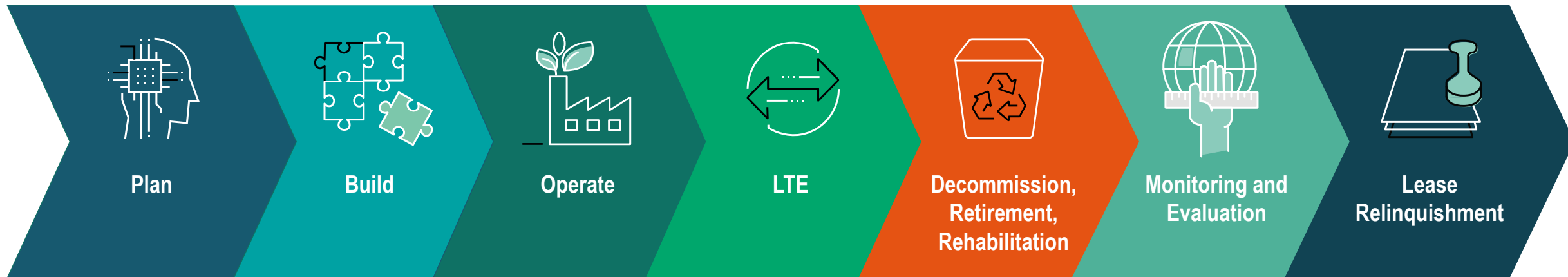


Source: BNP Paribas Asset Management, November 2021

The Traditional View: Asset Life Cycle

SEQUENTIAL – LONG TERM – CASE-BY-CASE PROJECTS

- Long life cycles ... 40+ years
- Well defined development and operational stages
- Sector- and case-specific



PARADIGM SHIFT - DECOMMISSIONING IS NOT THE END BUT THE BEGINNING...

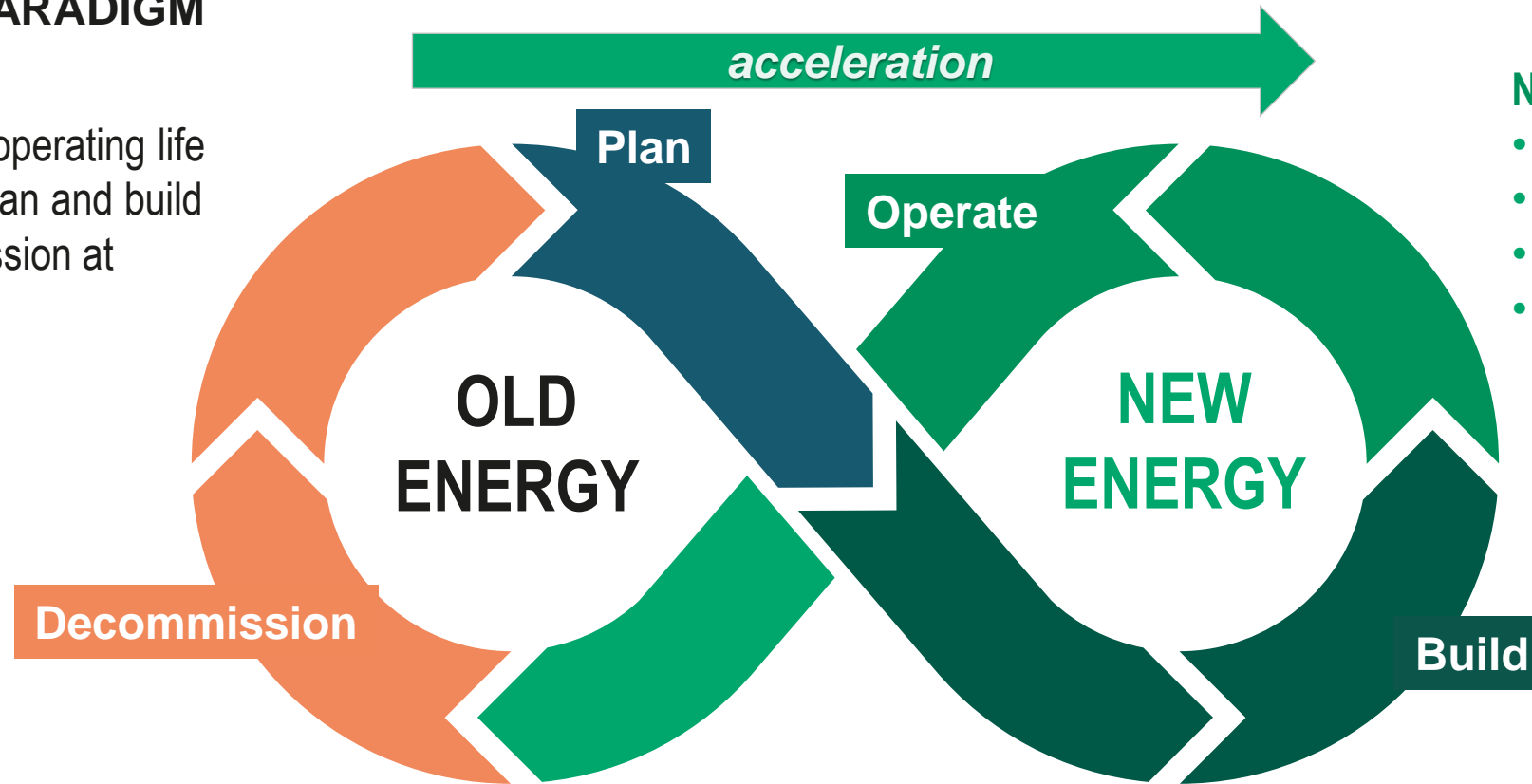
- Decommissioning is a key step in Repurposing
- Decommissioning is a holistic challenge for the global energy system

The Energy Transition Process

THE NEW PARADIGM

Old Energy:

- 40+ years operating life
- 8+ years plan and build
- “Decommission at leisure”



New Energy:

- 20 years operating life
- “Transitional technologies”
- Continuous replacement
- Plan and build on top of pre-existing assets

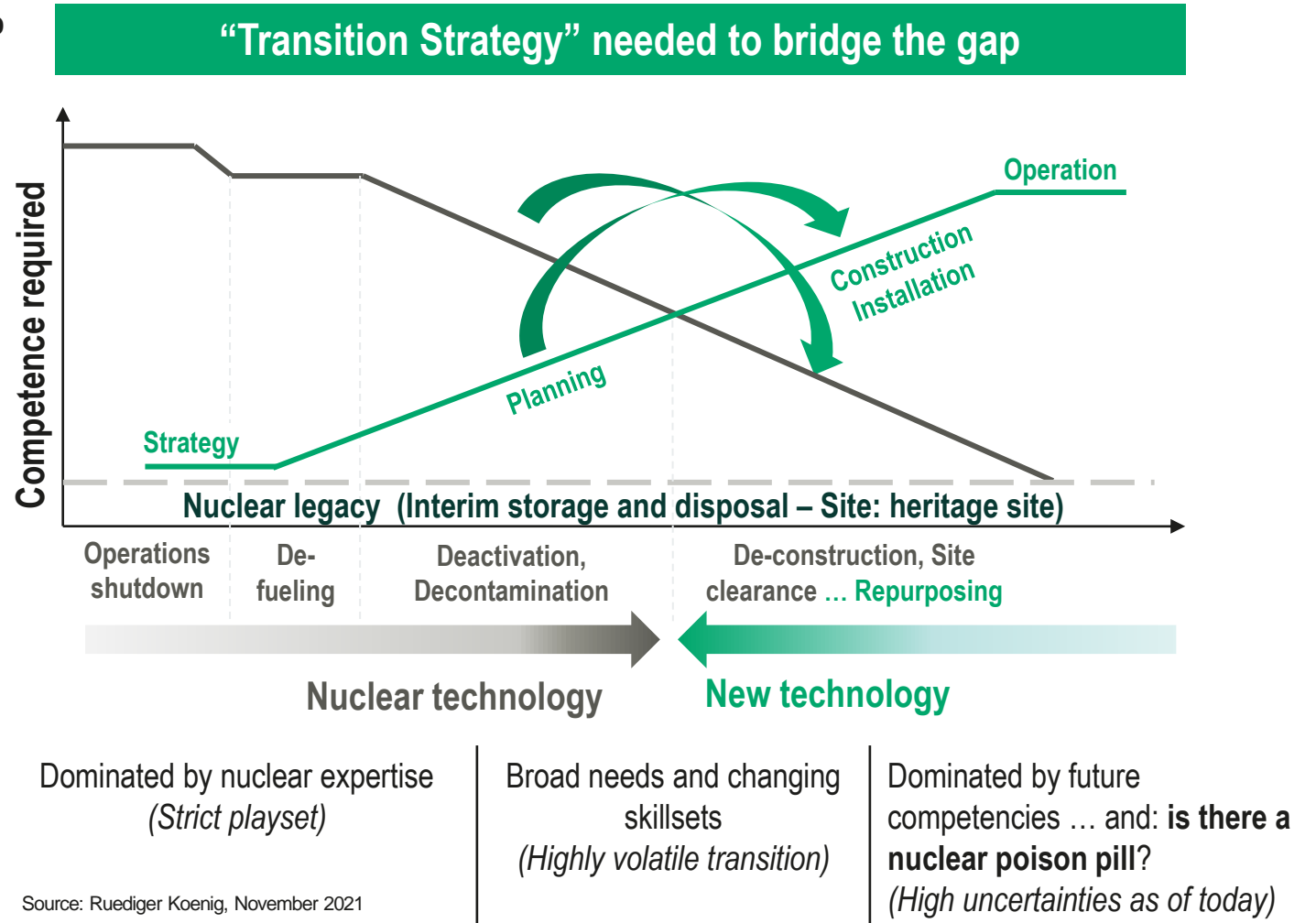
The speed at which industry can cycle through the transition depends on how smoothly it can bridge the Decommissioning Gap.

From “Decommissioning Project” to “Transition Programme”

BRIDGING THE DECOMMISSIONING GAP

- The energy transition process requires a gap to be bridged.
- Besides an efficient decommissioning project, a resilient programme is needed to manage uncertainty:
 - Changing expertise
 - Options for future use
 - Unclear status for (pollution) legacy
 - New competencies needed
 - Funding and societal demands.

Nuclear example provides an illustration of the complexity of the process.



Decommissioning

A KEY STEP IN THE ENERGY TRANSITION

- **Energy Transition** refers to the global energy sector's shift from fossil-based systems of energy production and consumption to renewable energy sources like wind and solar, as well as the entire system of new infrastructure and use processes needed
- **Polluting operating assets need to be retired** for either operating reasons or because they have already become stranded – but also because their sites and infrastructure often are valuable assets 'as is' or in the circular economy
- **Decommissioning / restoration / rehabilitation / remediation costs** affect corporate balance sheets, explicitly (as Asset Retirement Obligations or industrial / environmental liabilities) or implicitly (in third party valuation)

Energy transition and decommissioning



Decommissioning

DEEPER DIVE – OPERATIONAL CHALLENGES

- Operational: the decommissioning of complex industrial installations and the removal, remediation, restoration and / or storage of unwanted and / or polluted infrastructure and equipment over a number of years

Decommissioning cost components

Operational costs and decommissioning program management

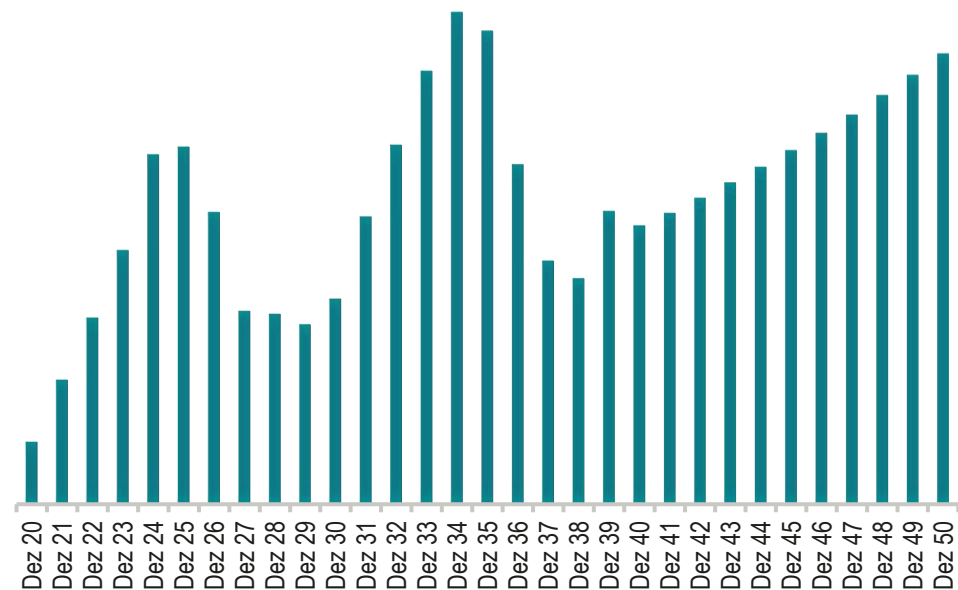
Operational capacity constraints

Safety and regulatory requirements

Decommissioning workforce needs

Long-term financial arrangements

Illustrative decommissioning cost profile



Source BNP Paribas Asset Management, Waste Analytics, Bloomberg, November 2021
For illustrative purpose only.

Decommissioning

\$ 3 603 000 000 000

DEEPER DIVE – FINANCIAL CHALLENGES (I)

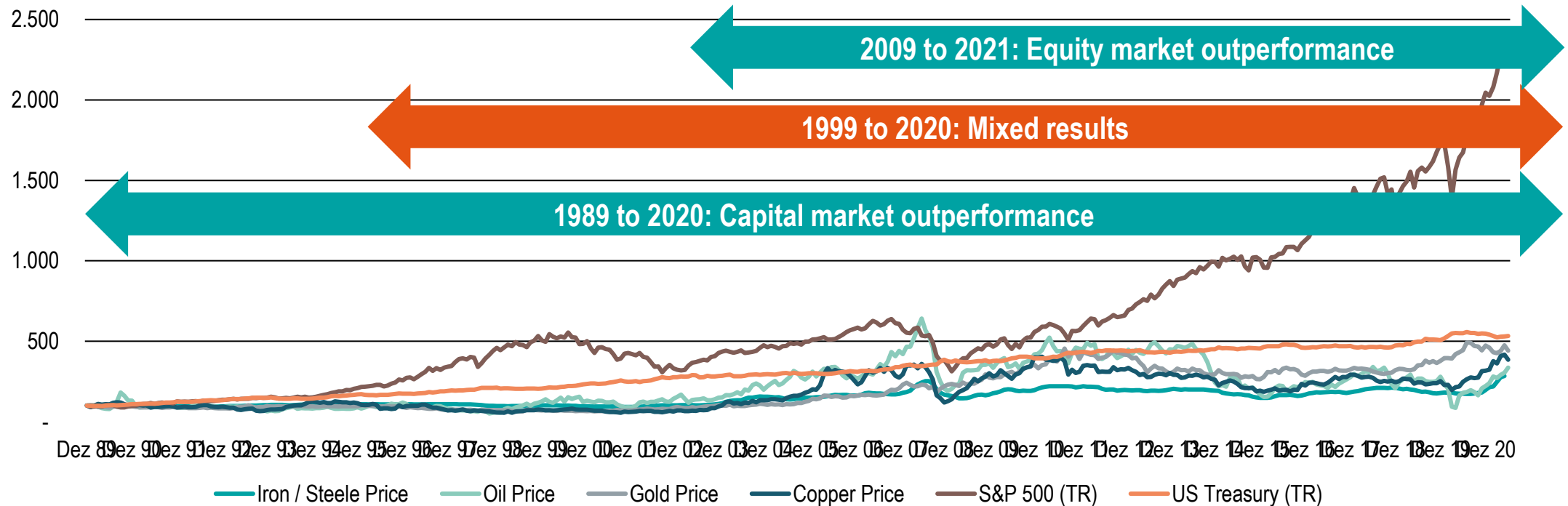
Global decommissioning liabilities (End 2019)					
(USD bn)	Nuclear	Mining	Oil & Gas	Coal Power Plant	Total
Europe	466	335	77	25	903
North-America	920	98	304	32	1,354
South-America	7	11	9	2	29*
Asia	333	565	99	172	1,169
Australia	0	72	3	2	77
Africa	2	58	6	5	71
Total	1,728	1,139	498	238	3,603

Source: BNP Paribas Asset Management, May 2020

Decommissioning

DEEPER DIVE – FINANCIAL CHALLENGES (II)

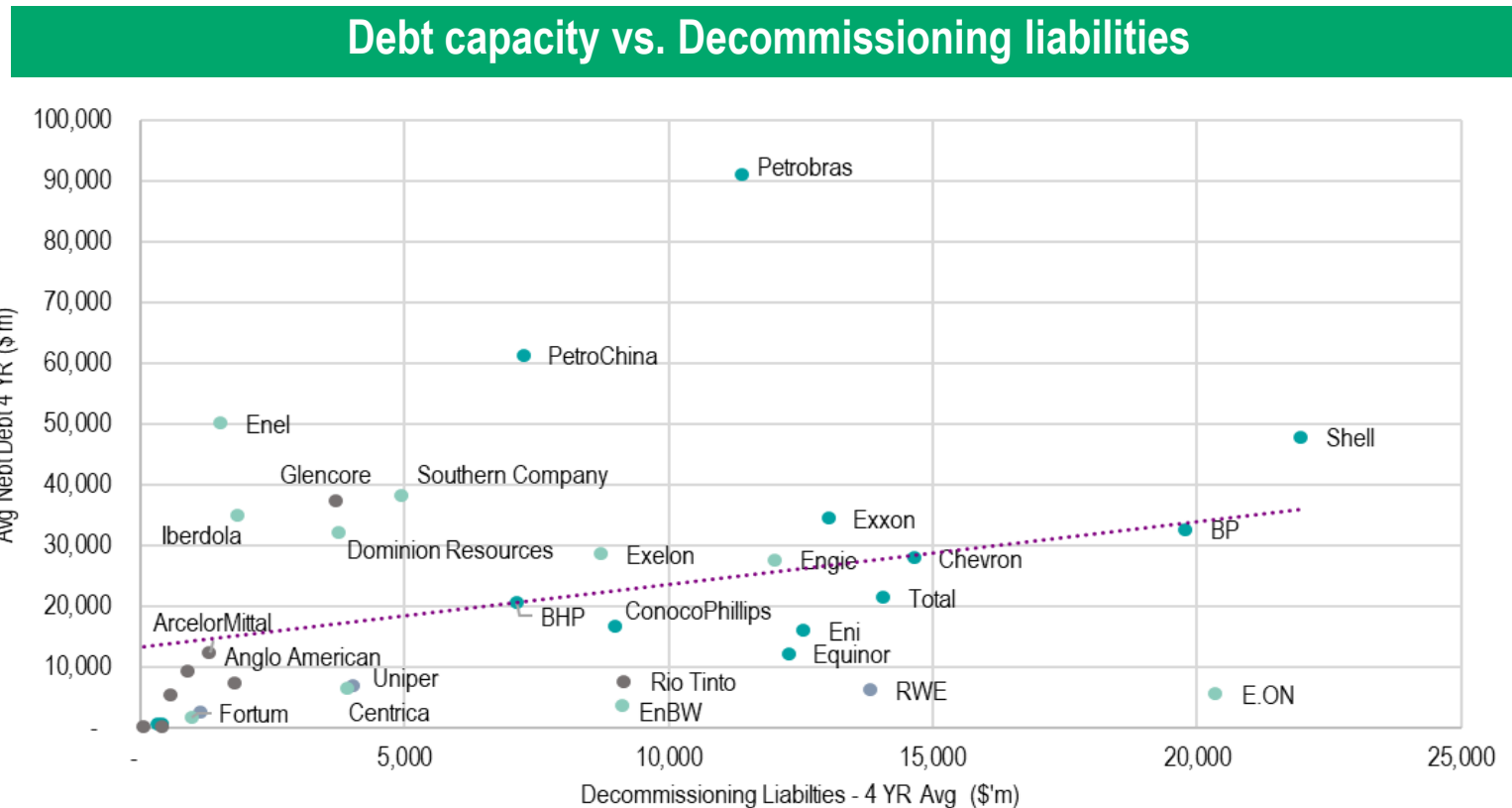
Commodity prices vs. S&P 500 and US Treasuries since 1989 (100 = Dec-1989)



Source: BNP Paribas Asset Management, November 2021
Past performance is not an indication of future performance. TR: Total Return

Decommissioning

DEEPER DIVE - FINANCIAL EXPOSURES

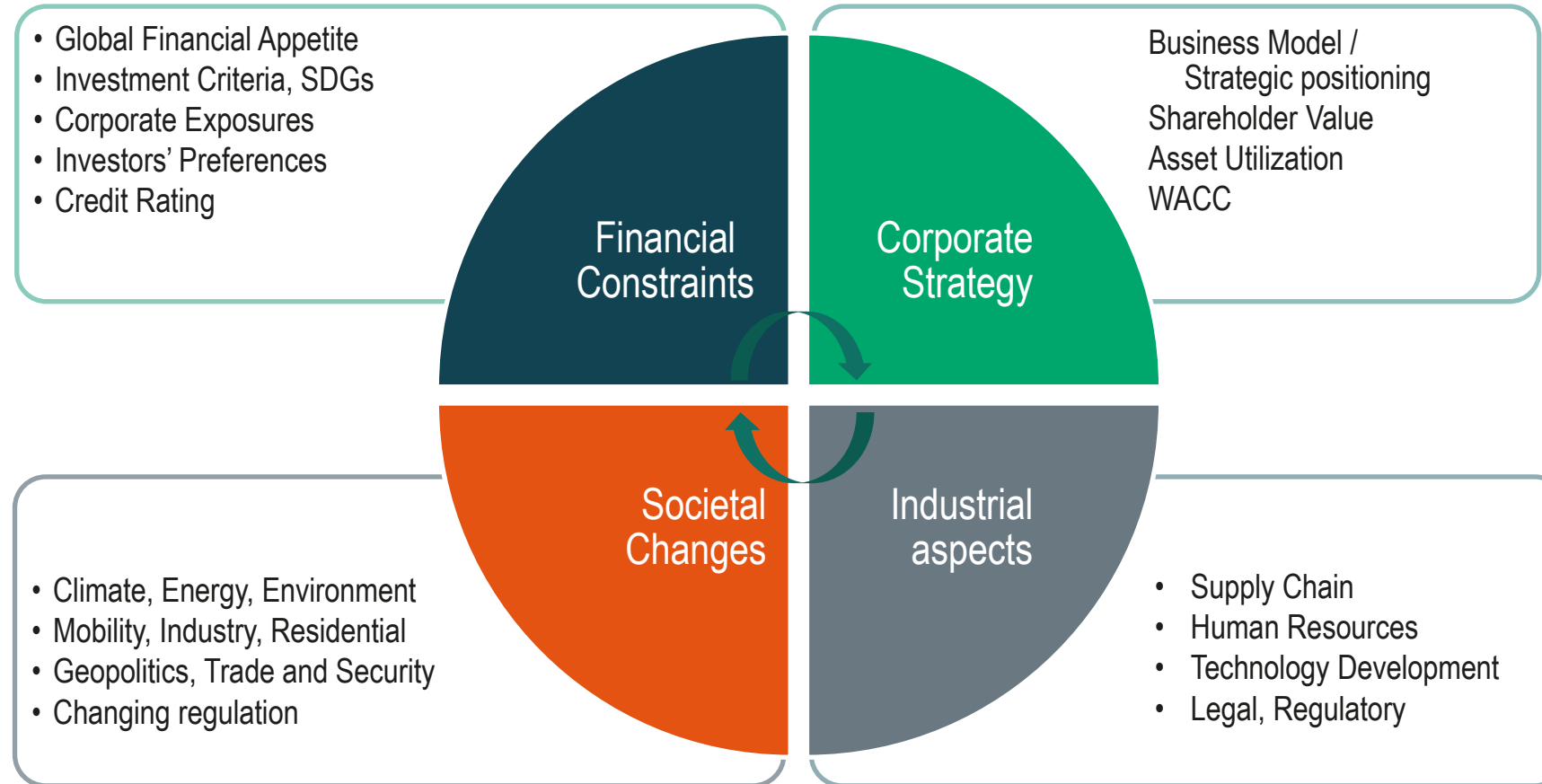


Source: BNP Paribas Asset Management, November 2021

YOU ARE NOT ALONE – A CRITICAL COMPETITIVE DYNAMIC

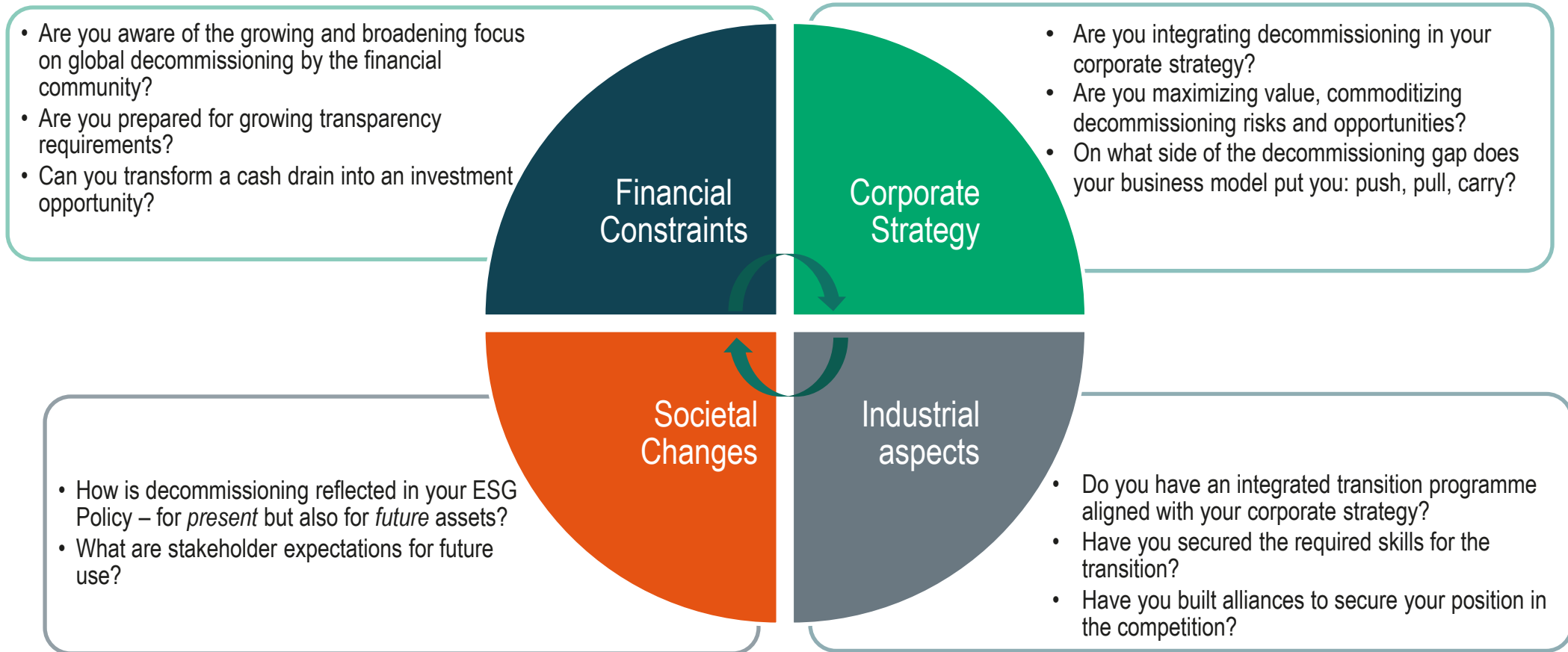
Transition and the Decommissioning Gap

HOLISTIC CHALLENGE - THE FOUR DIMENSIONS OF THE DECOMMISSIONING GAP



Transition and the Decommissioning Gap

PATHWAYS: WHERE TO BEGIN - WHERE IS YOUR COMPETITIVE POSITION?



Contacts

Ruediger W. (Rudy) Koenig



Interim Management and Executive Advice

Lerchenstr. 18
45134 Essen
Germany

T +49 201 843 9593
M +49 172 868 8800

rk@ruediger-koenig.com
www.ruediger-koenig.com

Julien S. Halfon



Head of Pensions and Corporate Solutions

5 Aldermanbury Square
London EC2V 7BP
UK

Tel: +44(0) 207 063 7258
Mob: +44(0) 750 099 6392

julien.halfon@bnpparibas.com

Disclaimer

BNP Paribas Asset Management France, “the investment management company,” is a simplified joint stock company with its registered office at 1 boulevard Haussmann 75009 Paris, France, RCS Paris 319 378 832, registered with the “Autorité des marchés financiers” under number GP 96002.

This material is issued and has been prepared by the investment management company.

This material is produced for information purposes only and does not constitute:

1. an offer to buy nor a solicitation to sell, nor shall it form the basis of or be relied upon in connection with any contract or commitment whatsoever or
2. investment advice.

This material makes reference to certain financial instruments authorised and regulated in their jurisdiction(s) of incorporation.

No action has been taken which would permit the public offering of the financial instrument(s) in any other jurisdiction, except as indicated in the most recent prospectus and the Key Investor Information Document (KIID) of the relevant financial instrument(s) where such action would be required, in particular, in the United States, to US persons (as such term is defined in Regulation S of the United States Securities Act of 1933). Prior to any subscription in a country in which such financial instrument(s) is/are registered, investors should verify any legal constraints or restrictions there may be in connection with the subscription, purchase, possession or sale of the financial instrument(s).

Investors considering subscribing to the financial instrument(s) should read carefully the most recent prospectus and Key Investor Information Document (KIID) and consult the financial instrument(s)' most recent financial reports. These documents are available on the website.

Opinions included in this material constitute the judgement of the investment management company at the time specified and may be subject to change without notice. The investment management company is not obliged to update or alter the information or opinions contained within this material. Investors should consult their own legal and tax advisors in respect of legal, accounting, domicile and tax advice prior to investing in the financial instrument(s) in order to make an independent determination of the suitability and consequences of an investment therein, if permitted. Please note that different types of investments, if contained within this material, involve varying degrees of risk and there can be no assurance that any specific investment may either be suitable, appropriate or profitable for an investor's investment portfolio.

Given the economic and market risks, there can be no assurance that the financial instrument(s) will achieve its/their investment objectives. Returns may be affected by, amongst other things, investment strategies or objectives of the financial instrument(s) and material market and economic conditions, including interest rates, market terms and general market conditions. The different strategies applied to financial instruments may have a significant effect on the results presented in this material. Past performance is not a guide to future performance and the value of the investments in financial instrument(s) may go down as well as up. Investors may not get back the amount they originally invested.

The performance data, as applicable, reflected in this material, do not take into account the commissions, costs incurred on the issue and redemption and taxes.

All information referred to in the present document is available on www.bnpparibas-am.com