Paris Session 2022

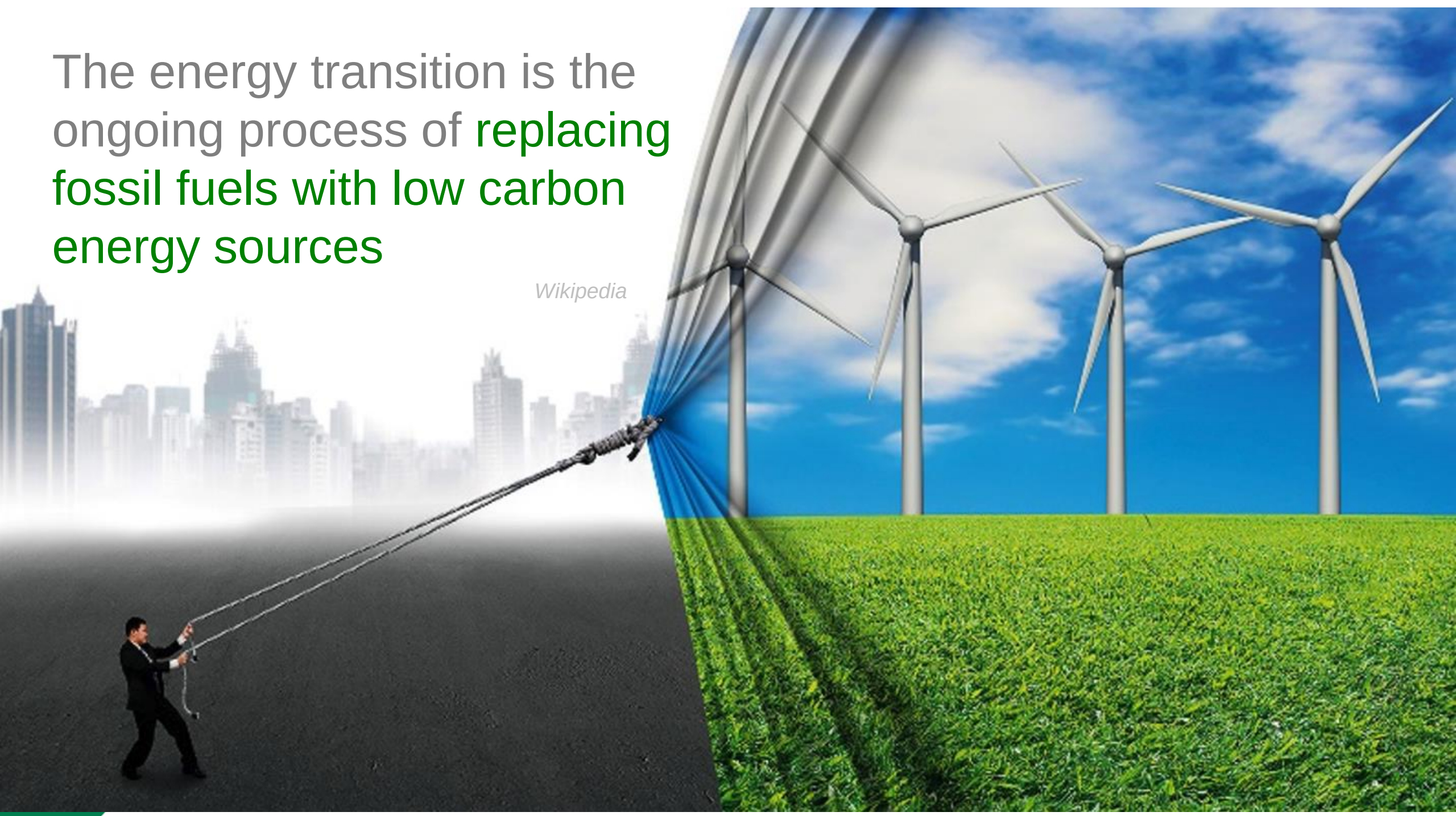
Opening Panel: Energy Transition

Session 1 - Energy Transition on Power Equipment

Session Chair: *Nenad Uzelec, A3 Chair*
Moderator: *Koji Kawakita, B3 Chair*

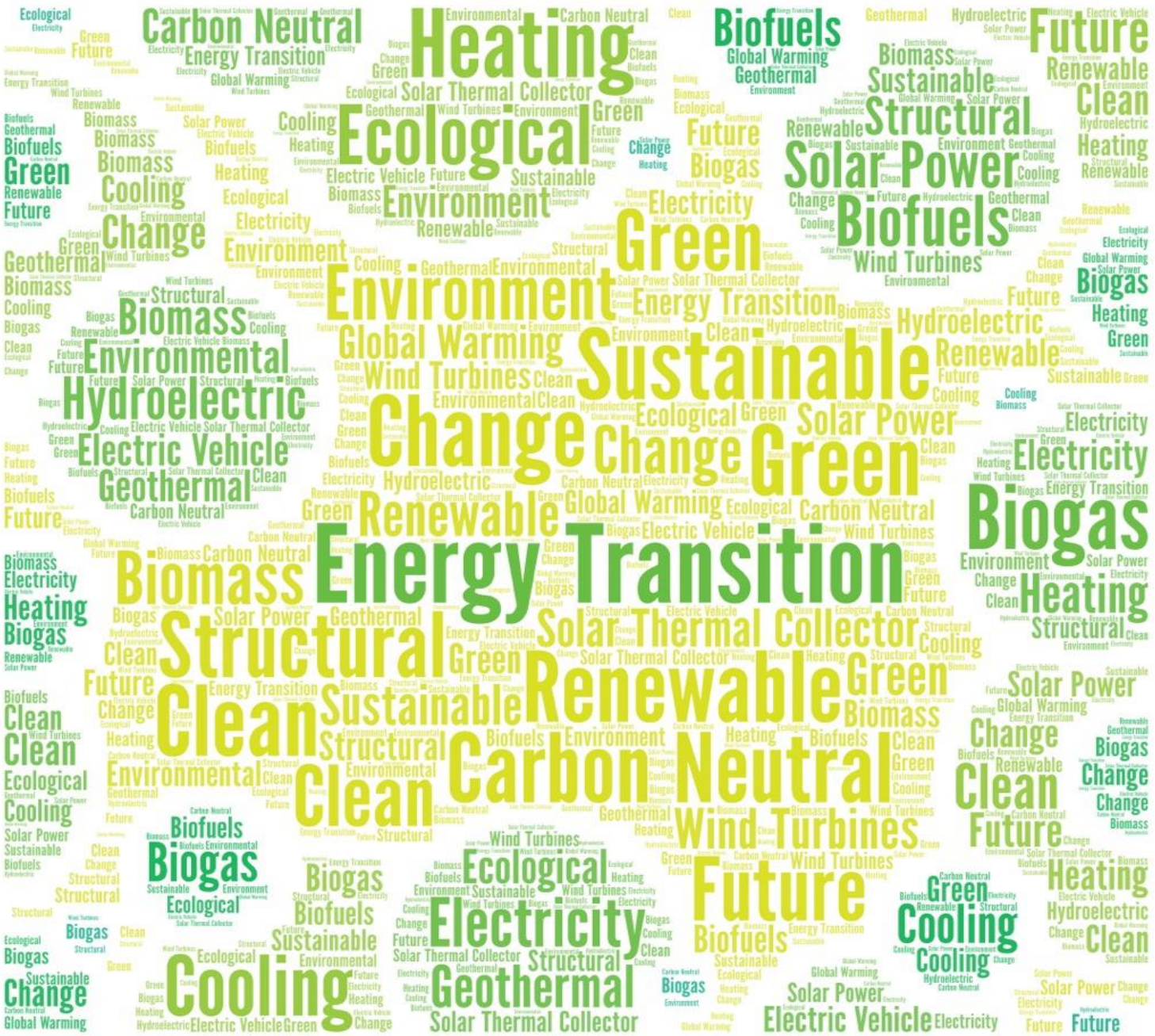
The energy transition is the ongoing process of replacing fossil fuels with low carbon energy sources

Wikipedia



Pretty straightforward?

Its ….. complicated



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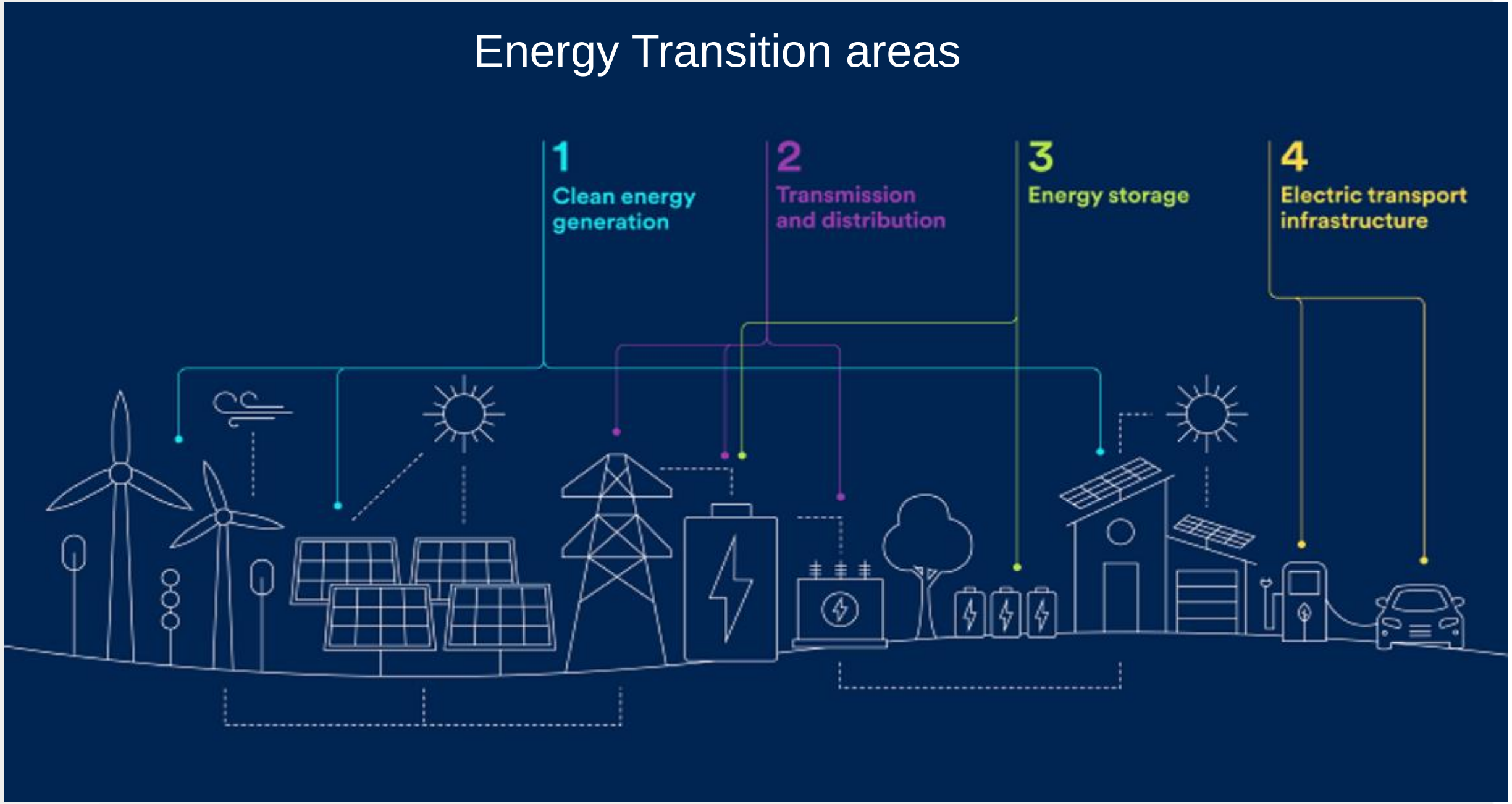
Energy Transition areas



Source: Schroders, October 2020

AGENDA:

- Presentations
  - **Getting ready for the future Power System of Systems:**
    Gerhard Salge*, Hitachi Energy*
  - **Taking renewables further - a greener grid needs every detail**
    Tim Holt, *Siemens Energy*
  - **No Excuses: Smarter, Greener, Faster**:
    Christophe Preve, *Schneider Electric*

- Panel Discussion:
  - Led by Session moderator: Koji Kawakita, Chair of B3 Study Committee

Speakers:

Dr. Gerhard SALGE, CTO of Hitachi Energy

Mr. Tim HOLT, Member of the Executive Board at Siemens Energy

Mr. Christophe PREVE, CTO of Schneider Electric, MV offers

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Opening Panel - Energy Transition

Session 1 - Getting Ready for the Future Power System of Systems

PRESENTER: Gerhard Salge, CTO, Hitachi Energy

29th August 2022

Energy system 2050: towards a carbon-neutral vision

CIGRE Keynote 2016


Global super grids


Power quality and demand management


Digitalization


Residential rooftop solar with micro and nano grids


Energy storage


New business models

Sustainability and energy security are key drivers for an accelerated energy transition

UNITED NATIONS PARIS CLIMATE AGREEMENT SIGNING CEREMONY — 22 APRIL 2016

2016

2022

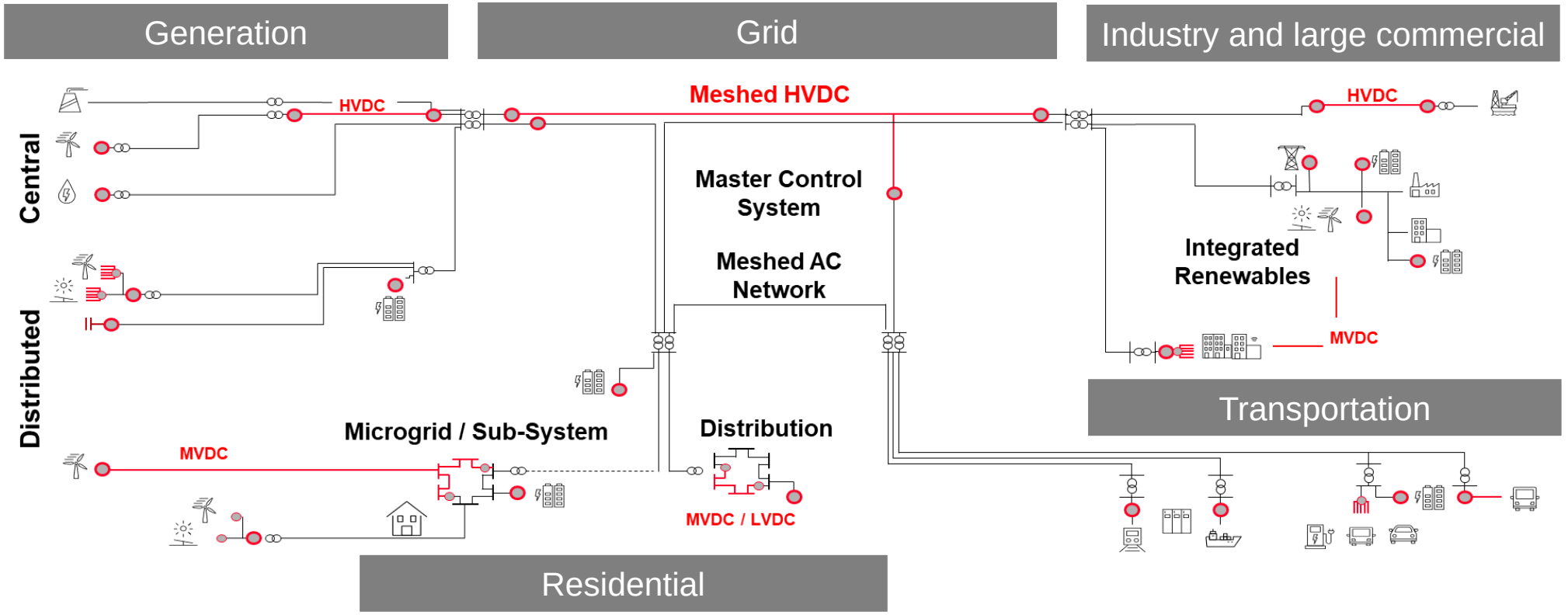
Urgency to accelerate power system ramp up

2050

Sustainable, flexible and secure energy system

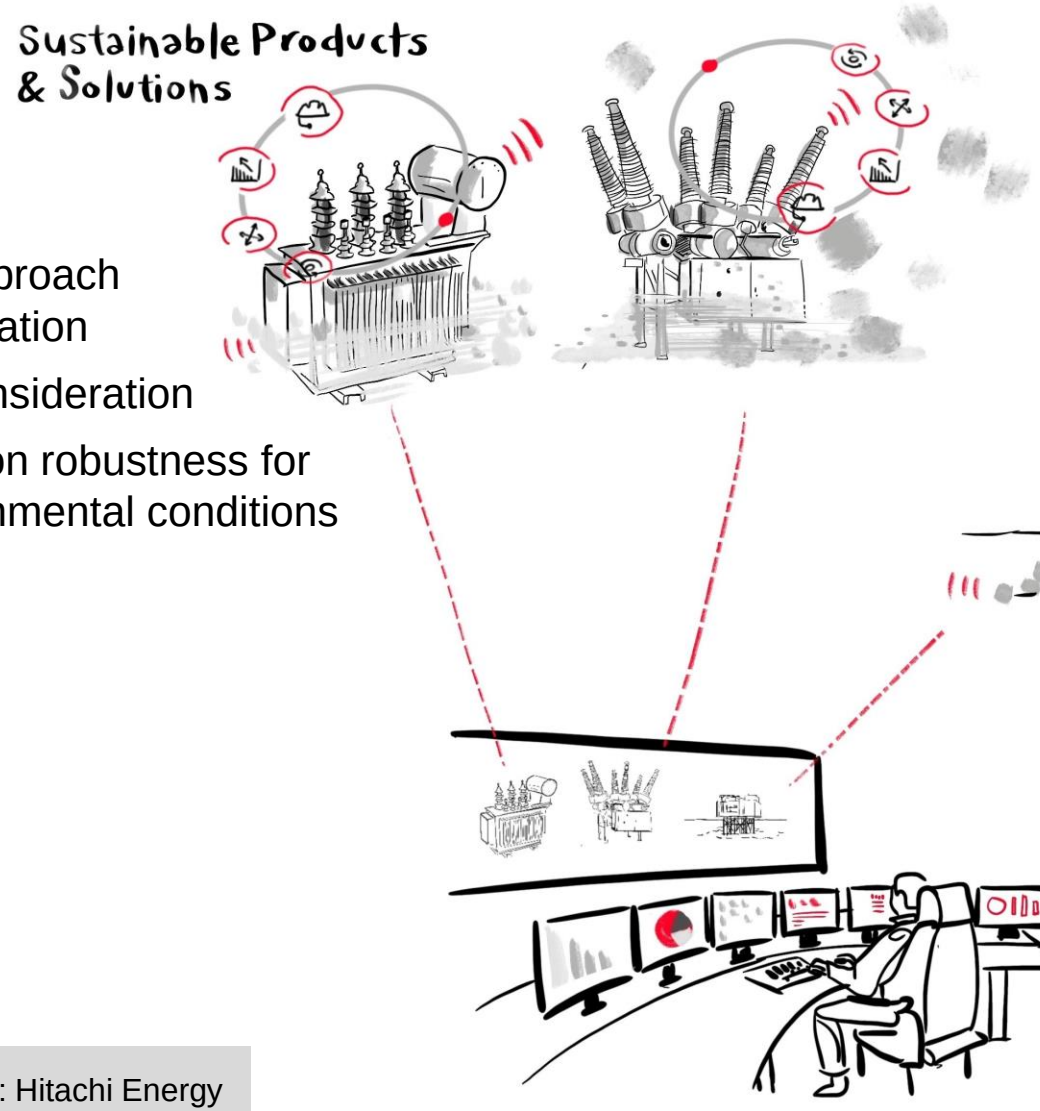
Global 2050 Power System: **Power generation capacity factor around 4 times of today and electrical energy transfer around 3 times of today**

The Future Power System of Systems



System of Systems: Flexible on/off sub-systems,
embedded DC and power system as backbone of the entire energy system

Fundamental technology areas for the power system evolution



- Total solution approach – no sub-optimization
- Full life-cycle consideration
- Product & solution robustness for changing environmental conditions

- Power quality
- Towards embedded (meshed) DC grids with vendor interoperability
- Flexible converter configurations for upgrades and replacements

- Number and variety of assets
- From time-based to condition-based maintenance
- System security, reliability & resilience

Towards a carbon-neutral energy system 2050

Urgent call for acceleration of power system ramp-up: Technology is available now

- Education
- Research
- Technology implementation
- Business models
- Investments
- Political & regulatory framework

Partnerships

Getting Ready
for the Future Power System of Systems

Gerhard Salge, CTO of Hitachi Energy

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Opening Panel - Energy Transition –

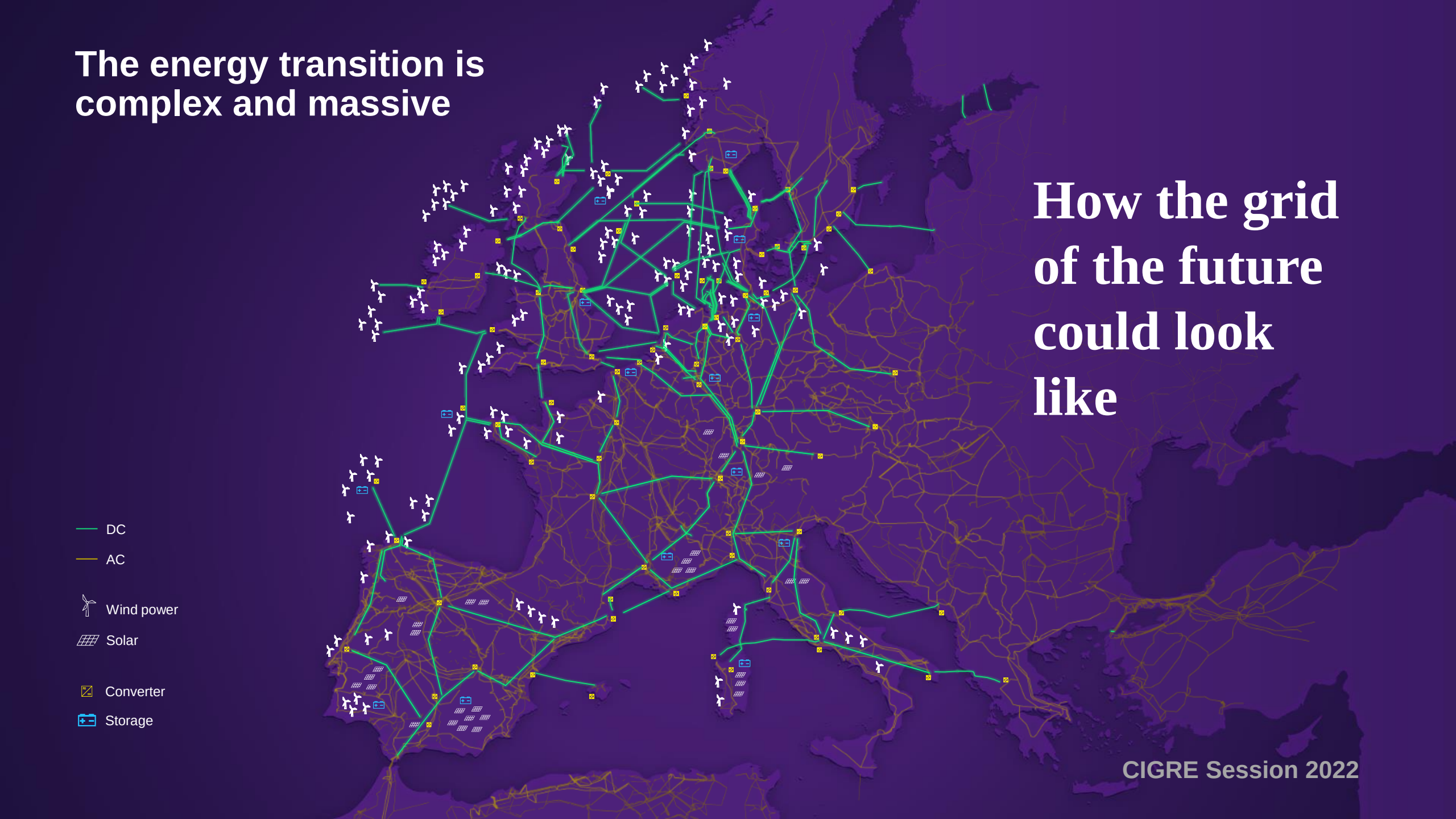
Taking renewables further - a greener grid needs every detail

Session 1 - Energy Transition on Power Equipment

Tim Holt
Siemens Energy Member
of Executive board

29th August 2022

The energy transition is complex and massive



How the grid of the future could look like

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Sustainable products for a greener grid

2,5%

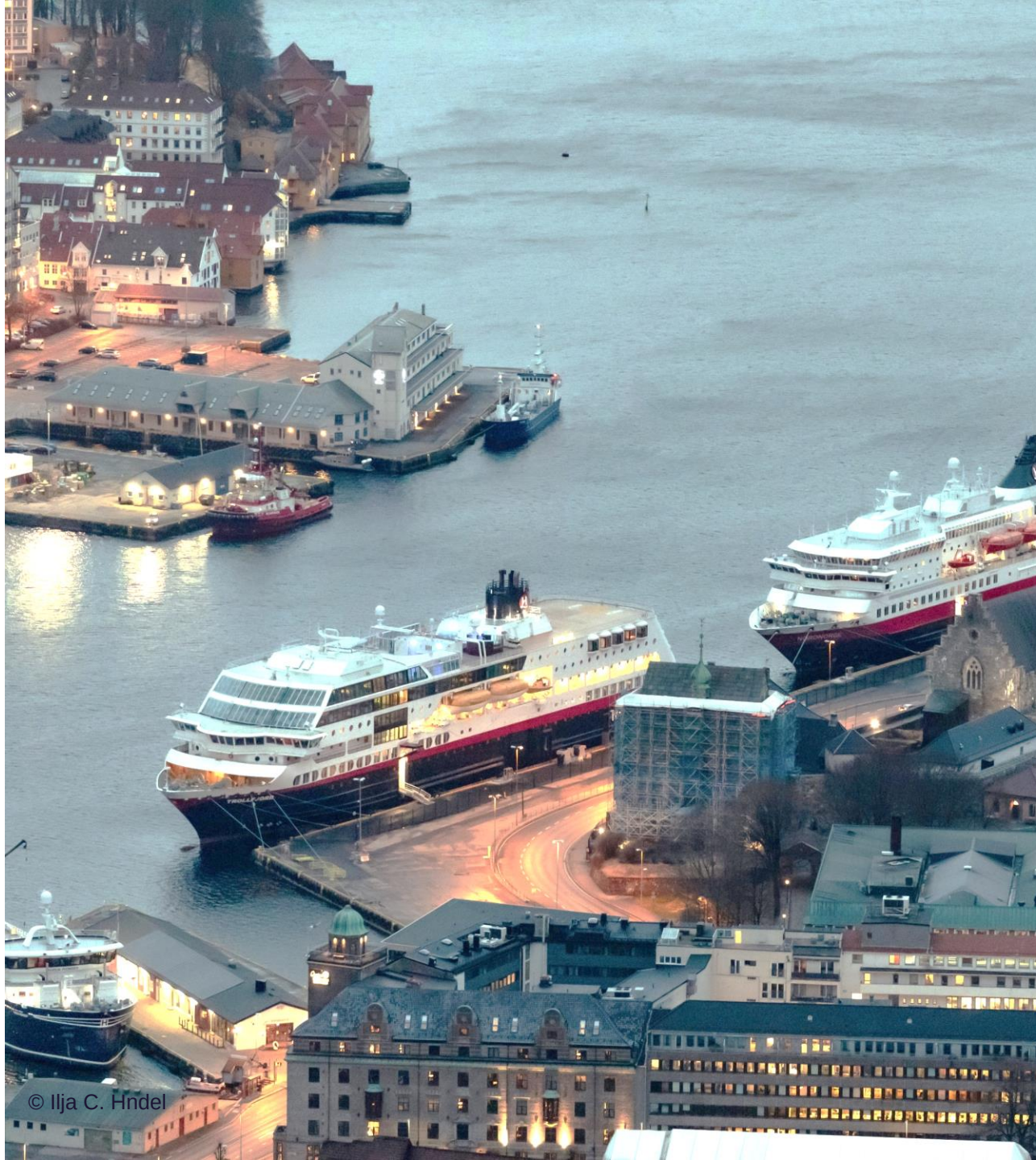
of total GHG emissions at EU level come from F gases

SF6 is

25,200 times

times more climate hostile than CO2

0 green houses gases
global warming potential
harm



Connecting renewables to the grid – technology is not the issue

c. 1/3

of global annual electricity consumption is from renewable power

10 years

to get a new transmission line into service

7,500km

of German grid which needs to be replaced


We need to secure our grids to accelerate the energy transition, with the help of green products, strong partnerships and serious investments
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Taking renewables further - a greener grid needs every detail

Tim Holt, Siemens Energy member of executive board

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Opening Panel - Energy Transition – **No Excuse: Smarter, Greener, Faster**

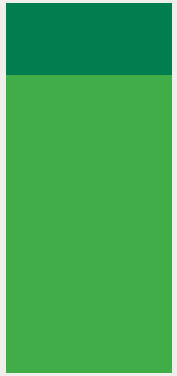
Session 1 - Energy Transition on Power Equipment

Christophe Prévé
Chief Technical Officer
Medium Voltage

29th August 2022

36.3 Gt

IEA: 2021 CO2 emissions from energy combustion and industrial process **(all-time high!)**



~3 Gt/a **Current pledges** by 2030*

~10-15 Gt/a **Minimum required annual reduction** by 2030 for 1.5 °C

We need to save 3-5x more CO_2 emissions

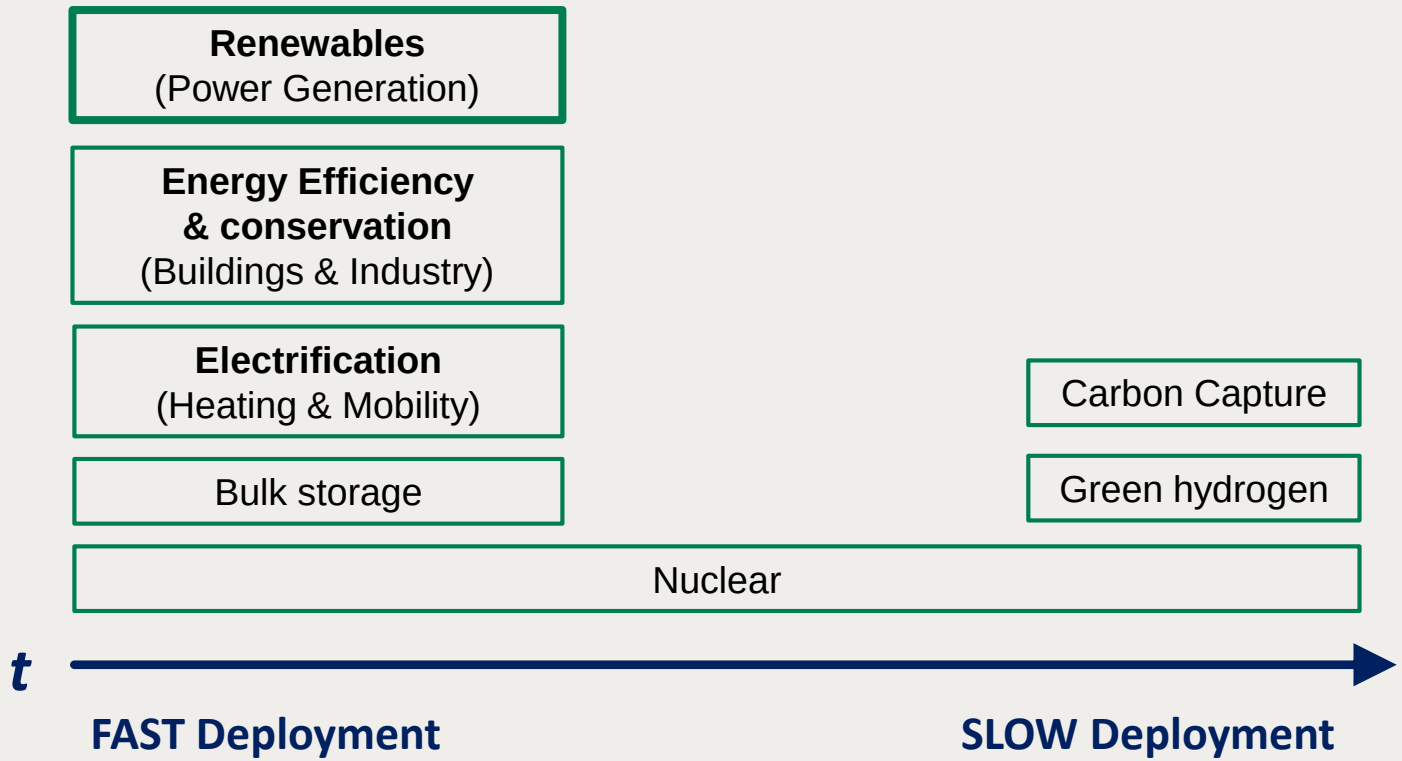
between now & 2030 to limit global warming to 1.5-degrees.

So, what should we do?

*based on assessment of ca. 30 Gts energy –related CO2-emissions from NAM, Europe, China, and Asian OECD, across sectors

Our Options Don’t Decarbonize at the Same Pace

We should take the fast track.



There are 4 Pillars of Sustainable T&D Equipment

1. Reduce CO2 footprint & get rid of SF6
2. Join the circular economy
3. Extend product life
4. Improve efficiency with DC

20 000
tons SF_6
per year for MV + HV
=
0.5 Gt CO2 eq./year, or the emissions of
150M
passenger cars

Why We Need Modern MV RMUs to Handle Massive Renewable Energy Deployment

1. Remote control & monitoring to support voltage management
2. High mechanical endurance for frequent ring reconfiguration
3. RMU filled with pure air
4. Predictive maintenance and asset management with condition monitoring
5. Cybersecurity

2022: 10M

MV RMUs

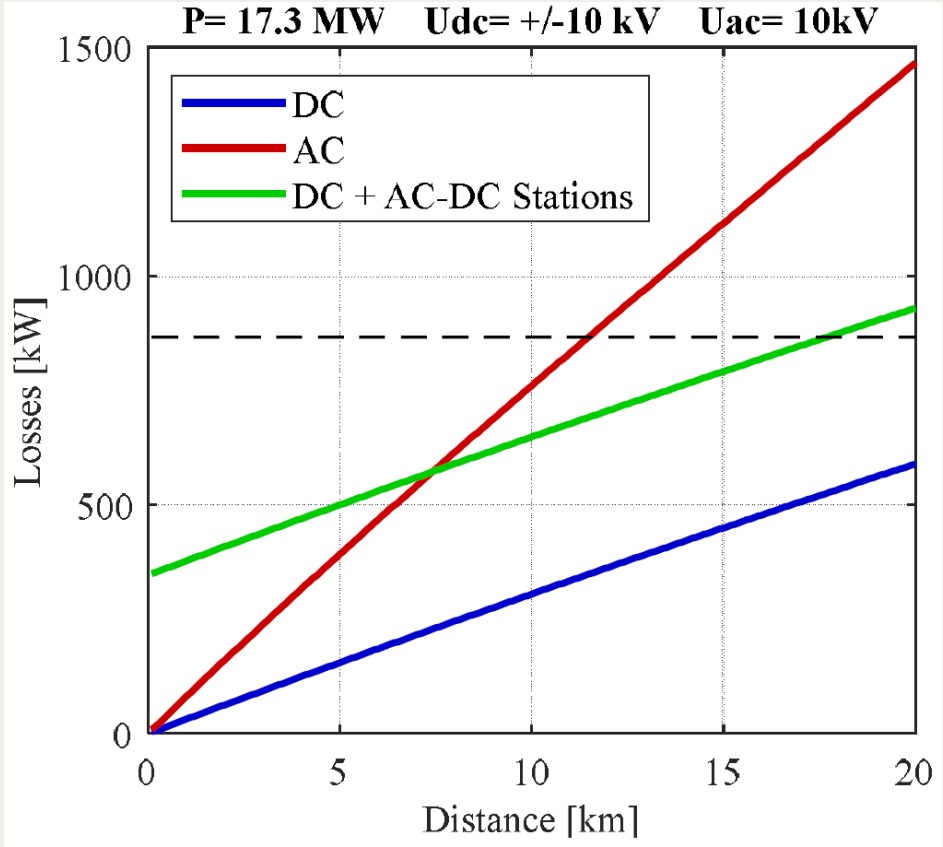
at the heart of global electricity distribution

2050: ?M

DC improves efficiency in MV network

1. Reduction of losses for long distance
2. Higher power capability
3. Easier power flow management
4. Better grid stability

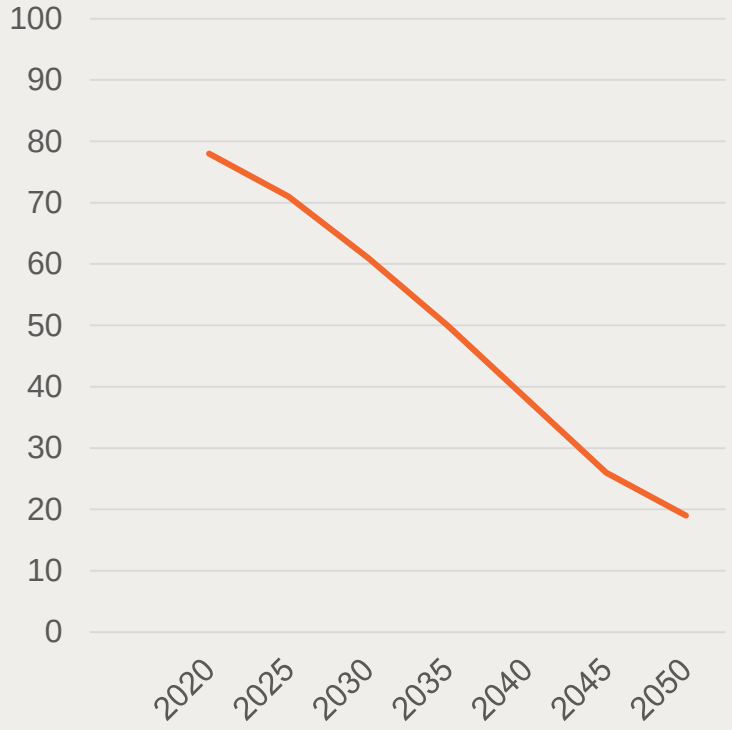
To do: Technology development



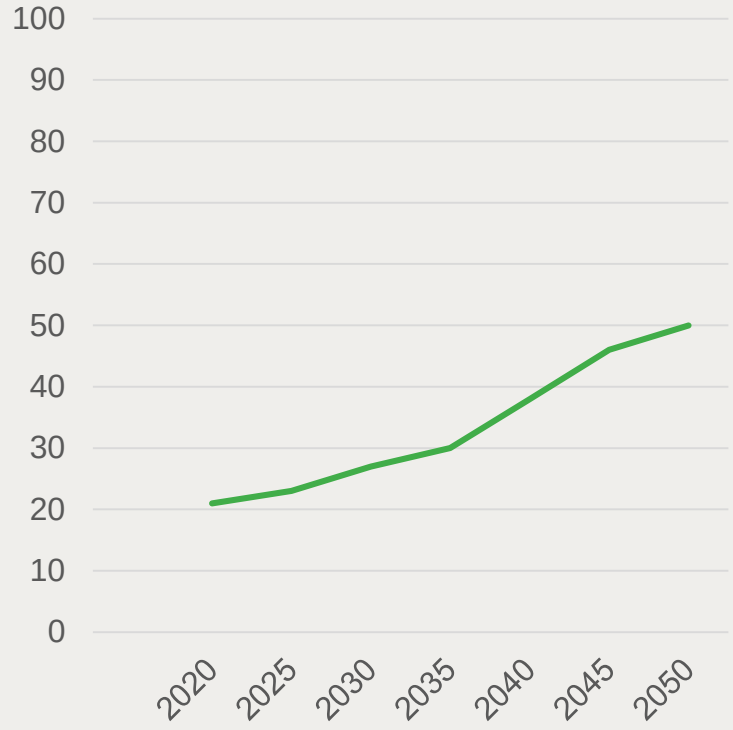
Source: SuperGrid Institute
EPE'21 ECCE Europe, Sep 2021

Envision the Bright Future of Net-Zero Carbon in 2050

Fossil fuels - Share of primary energy



Electricity - Share of total final consumption



Growth of MV infrastructure

Source: **bp Energy Outlook 2022,** *Net Zero scenario*

No Excuse: Smarter, Greener, Faster

Christophe Prévé

Question 1:

Impacts of renewable energy to energy transition

Do we need **new technological advancements** to solve these issues and ensure the stable operation of T&D networks?

Or more deployment of the existing technologies & products?

Question 1:

Impacts of renewable energy to energy transition

Can you think of some **new functions** to be **added to substations and their equipment** that can help with mitigation of these issues?

What functions would those be?

Question 1:

Impacts of renewable energy to energy transition

What are the impacts of this massive penetration of renewable energy on **MV network**?

Question 2:

Management of T&D assets to support energy transition

What kind of technologies do you think are still needed to maintain and properly manage **ageing transmission power assets** in the future?

Question 2:

Management of T&D assets to support energy transition

What kind of technologies can improve **sustainability** of MV equipment?

Question 3:

Energy transition on Power Equipment

What do you think the **role of CIGRE** should be in light of energy transition?

What does CIGRE needs to transition to?

End of Panel Discussion

Massive and Complex

We are all affected

Working towards the same goal

We MUST accelerate

WE MUST DO IT
TOGETHER

Thank you for your participation

Continue to the Session 2
Changes in Planning and Design of Transmission and Distribution Systems