

# Paris Session 2022



## Opening Panel Session 3

*Re-designing regulatory & market tools  
considering sector coupling scenarios*

# *Evolutions of our energy system and market design*

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Boston Consulting Group*





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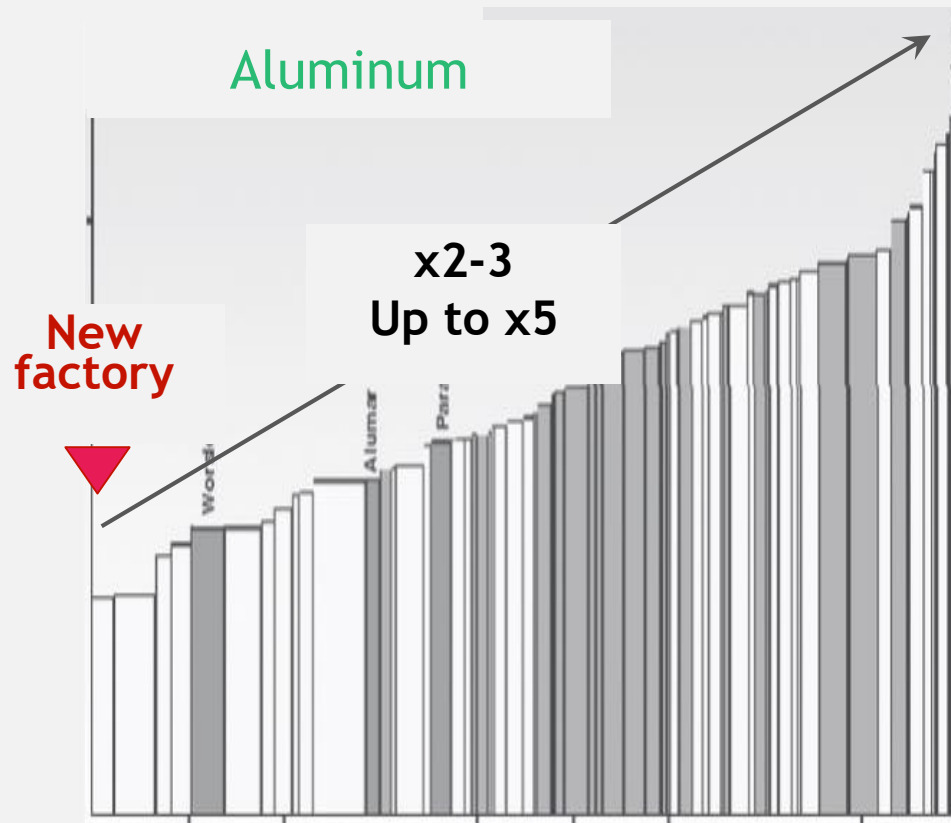
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# Evolutions of our energy system and market design

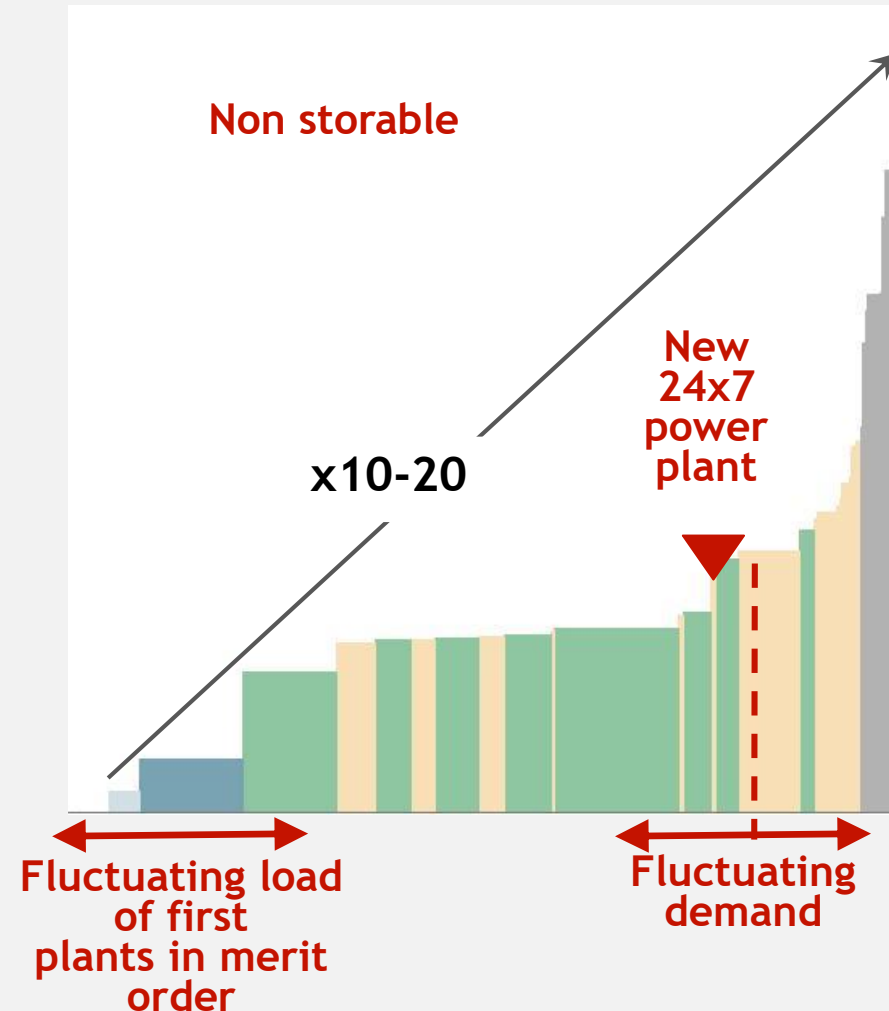
AUGUST 2022

# Can a merchant power market even work ?

## Typical commodity supply curve



## Power supply curve



New Baseline

Pre-defined Scenarios

None

Set

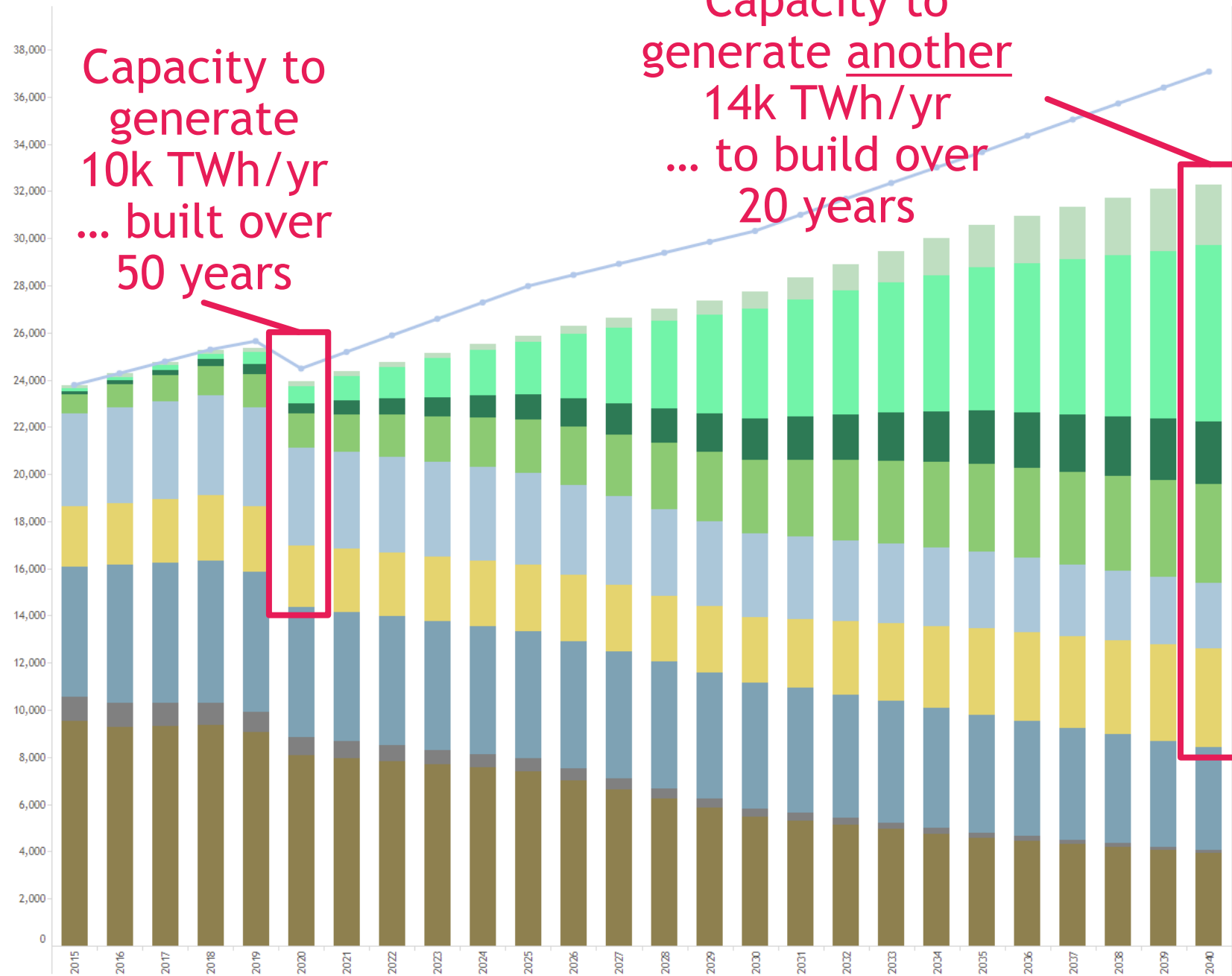
GDP Growth

+2.8%/yr

Disruptions

- 1 ICE Efficiency 4.3 l
- 2 Oil Supply 80\$/bbl
- 3 Gas in Petrochemicals High
- 4 Gas in trucks High
- 5 LNG in Marine High
- 6 Gas in Power High
- 7 Gas in Industry and building Baseline
- 8 Coal Power Replacement High
- 9 Clean Coal Development (CCS) High
- 10 Decentralization Solar PV High
- 11 Central Wind and Solar Power High
- 12 Biofuel breakthrough No
- 13 Hydrogen Breakthrough High
- 14 Modular Nuclear High
- 15 Thermal Efficiency of Buildings High
- 16 Efficiency of Lighting and Appliances High
- 17 Electrification of Heating High
- 18 E Penetration High

Power Generation (TWh)



Capacity to generate 10k TWh/yr ... built over 50 years

Capacity to generate another 14k TWh/yr ... to build over 20 years

	%Var 2040 vs 2015	CAGR
New Baseline	55.9%	1.8%
Model	35.7%	1.2%

**Filters**

Source: (Multiple values)

Region: (All)

**View Options**

Show: New Baseline

**Split X-axis by**

- None
- Source
- Region

**Split Color by**

- Source
- Region

**PG Options**

- GW
- TWh

**Legend**

- Baseline
- New Baseline
- Other Renewables
- Rooftop Solar PV
- Solar PV Utility
- Wind
- Hydro
- Nuclear
- Gas
- Oil
- Coal

A market  
design...  
... to be  
redesigned

From optimal deployment of largely existing resources  
to supporting the largest investment program on this planet

# Challenges already being observed today in markets with lots of renewables

## Balancing

- Steeper within-day ramps
- More severe seasonal imbalances
- Adequacy problems during "renewable droughts"
- Minimum load from must run conventional plants
- Etc...

## Economics

- Near zero marginal cost during renewable abundance
- Missing money for dispatchable, reserve capacity
- Increasing price volatility
- etc...

## System stability

- Lower natural inertia levels
- Lower system strength (voltage)
- Network congestion causing curtailment
- etc...

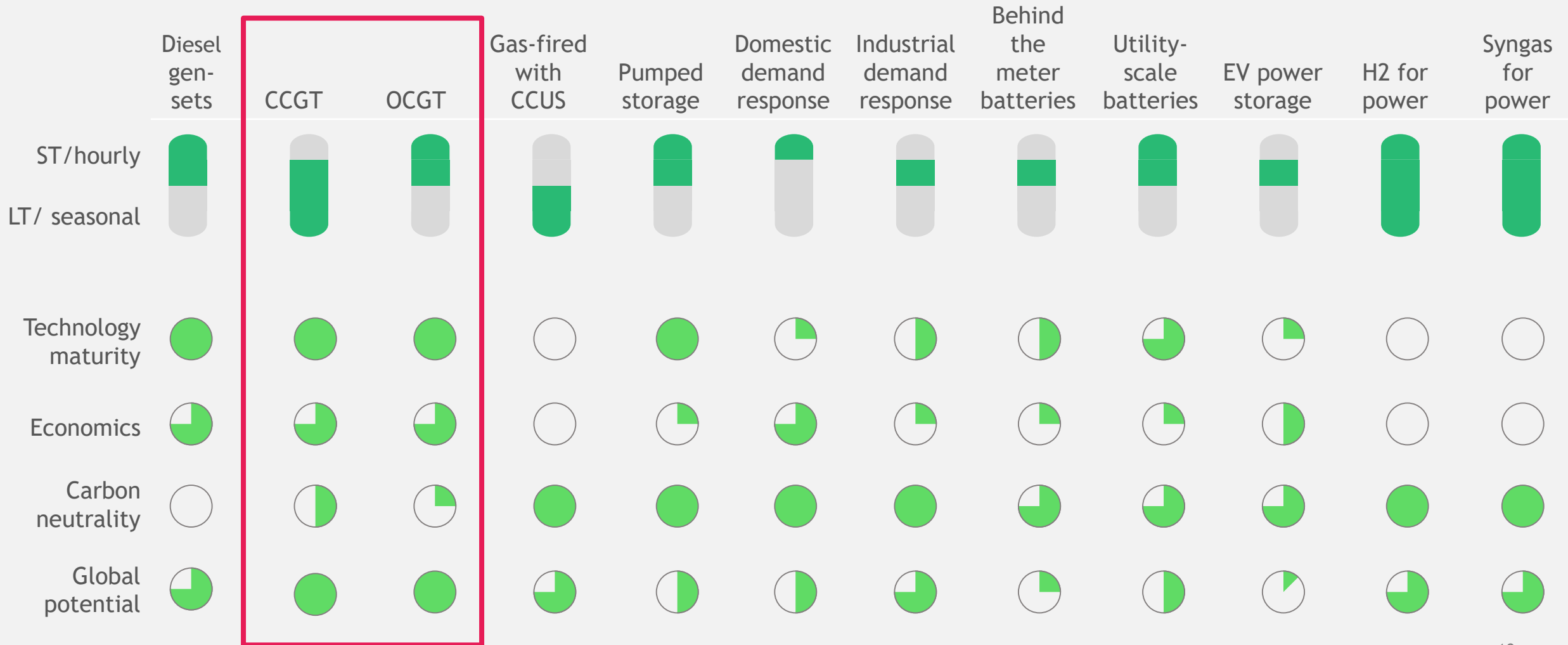
A market  
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Mechanisms to address  
an increasing load volatility challenge



# The question of carbon neutral balancing remains unsolved to date

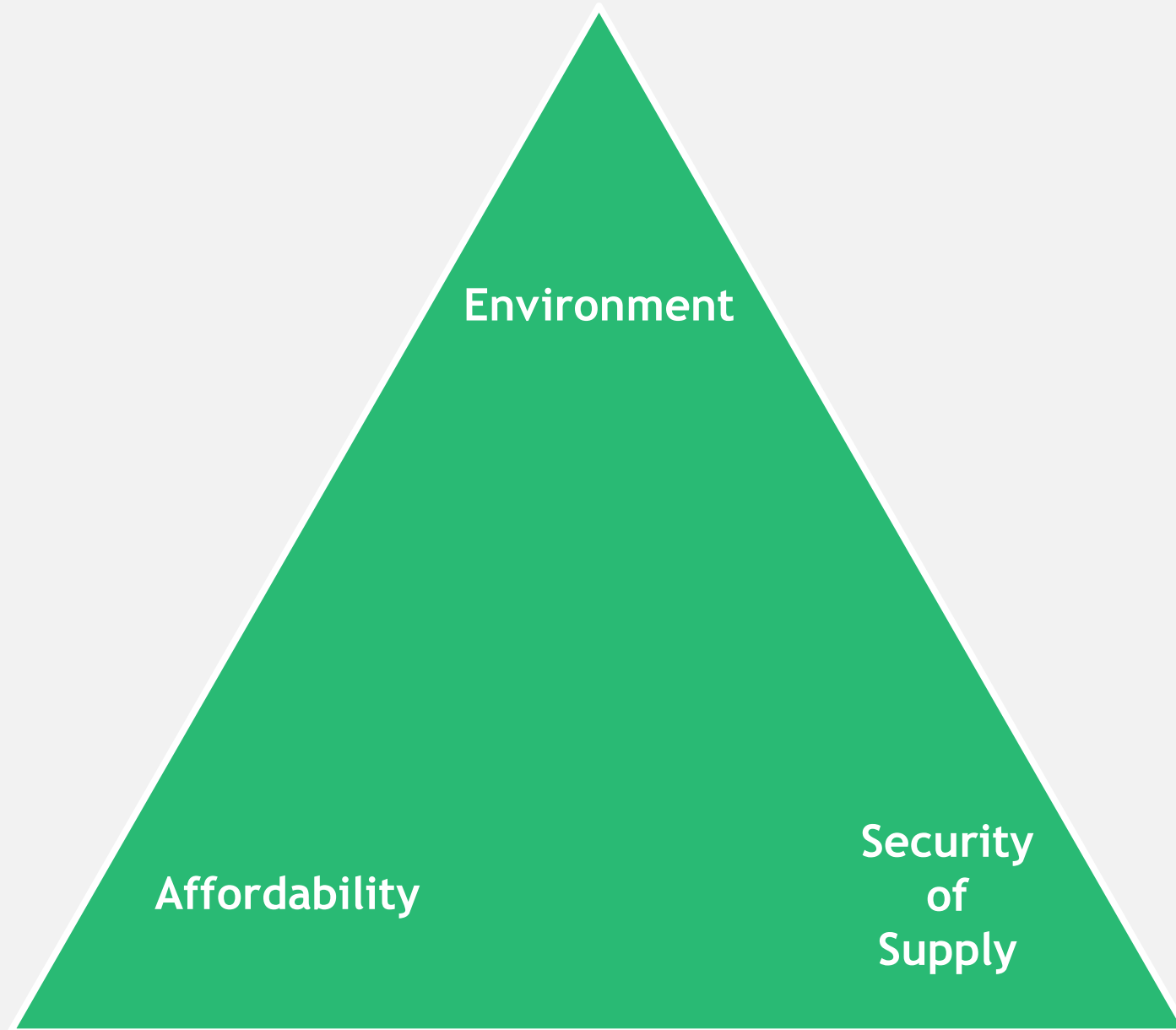


# A market design... ... to be redesigned

From optimal deployment of largely existing resources to supporting the largest investment program on this planet

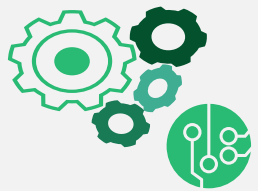
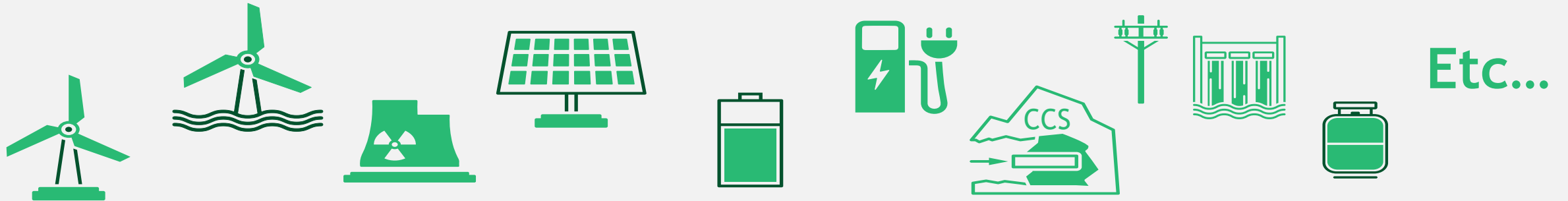
Mechanisms to address an increasing load volatility challenge

Integration of gas and power market design, for a while





# Requirements for investments to be made



Technology



Investment capital



Societal acceptance



Right policies





# A market design... ... to be redesigned

From optimal deployment of largely existing resources to supporting the largest investment program on this planet

Mechanisms to address an increasing load volatility challenge

Integration of gas and power market design, for a while

Set long term economic incentives for a clear decarbonation path

We are going to make massive energy efficiency gains



800 lumen, 50 W



800 lumen, 6.5 W

We are going to make massive energy efficiency gains,  
are we?





# A market design... ... to be redesigned

From optimal deployment of largely existing resources to supporting the largest investment program on this planet

Mechanisms to address an increasing load volatility challenge

Integration of gas and power market design, for a while

Set long term economic incentives for a clear decarbonation path

Get serious on energy efficiency and frugality

# Energy policies we need

Trade-offs made explicit

Long enough horizon

Big picture / entire system view

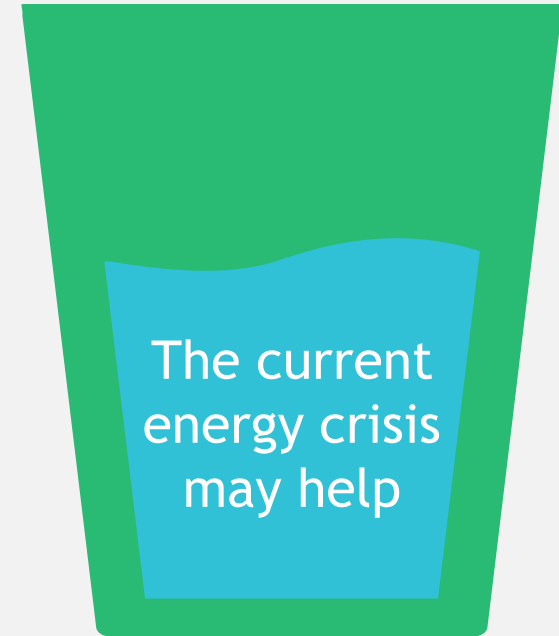
Stable rules of the game

Usage- as much as supply-centric

How do we think  
about this  
transition?



How do we think  
about this  
transition?





# Thank you!

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# SECTOR COUPLING SCENARIOS

Re-designing regulatory & market tools  
considering sector coupling scenarios

OPENING PANEL

3<sup>rd</sup> session

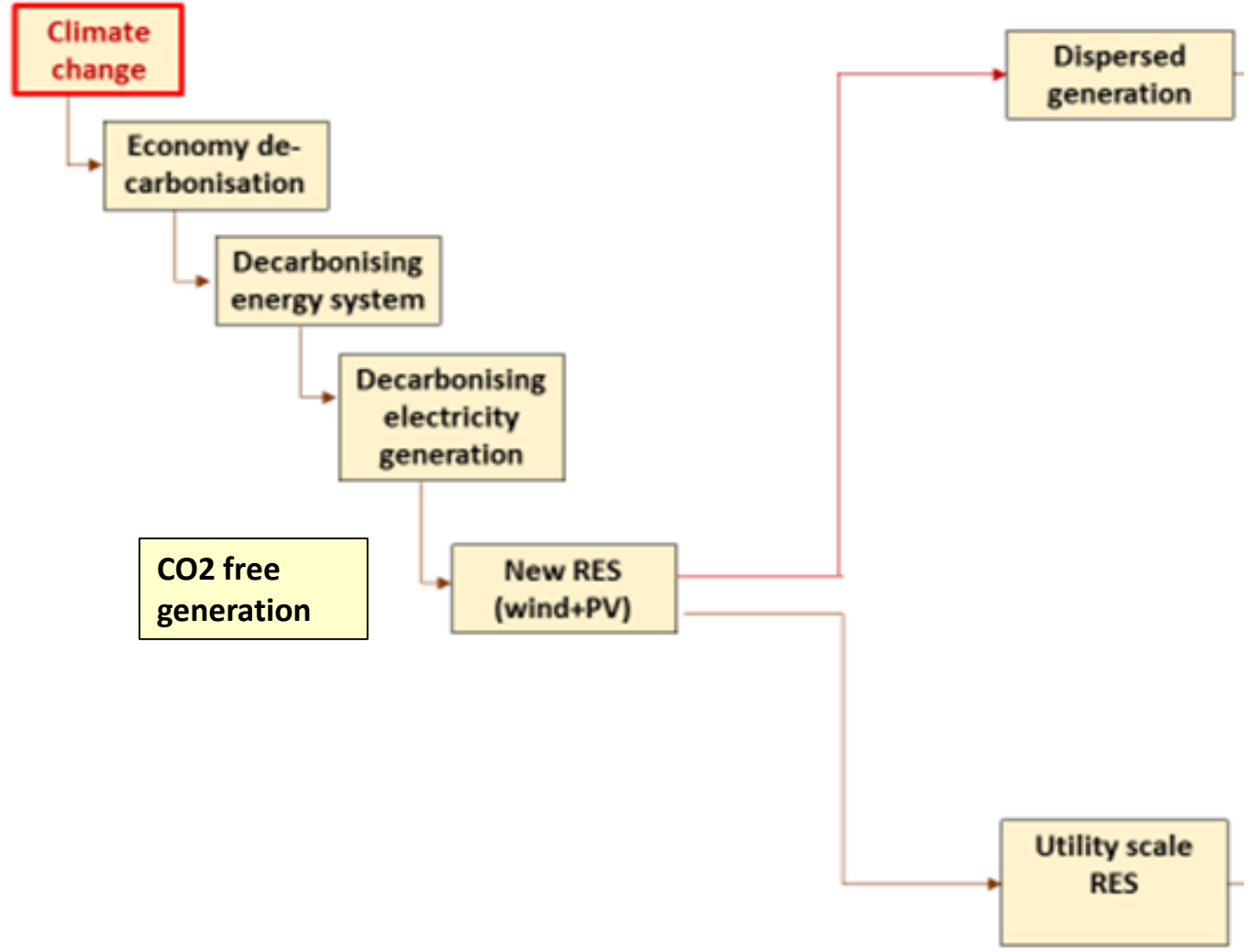
Paris – 29 August 2022



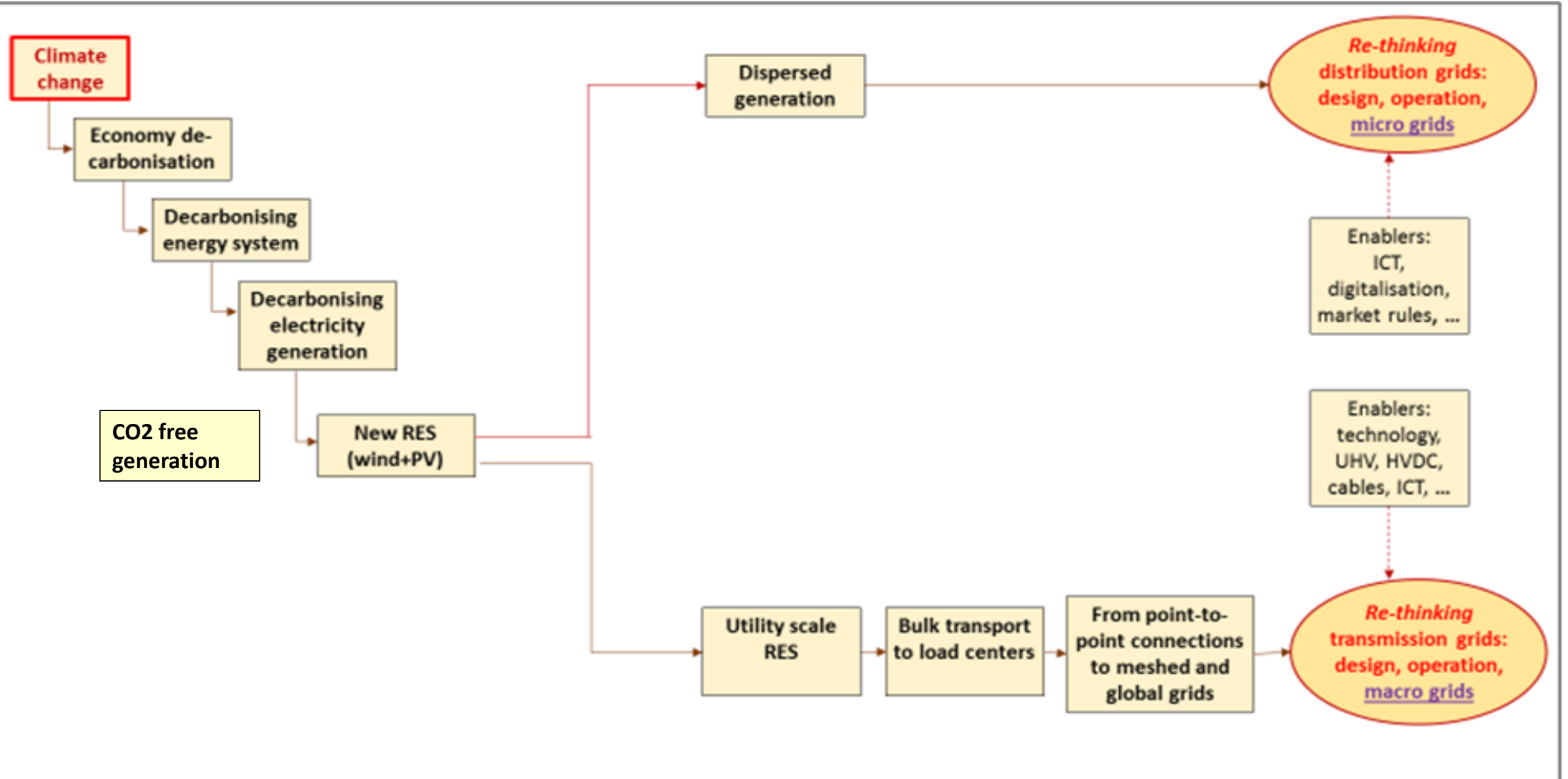
**cigre**

For power system expertise

# ENERGY TRANSITION IMPLIES RETHINKING MOST OF LEGACY SYSTEM AND MINDSET

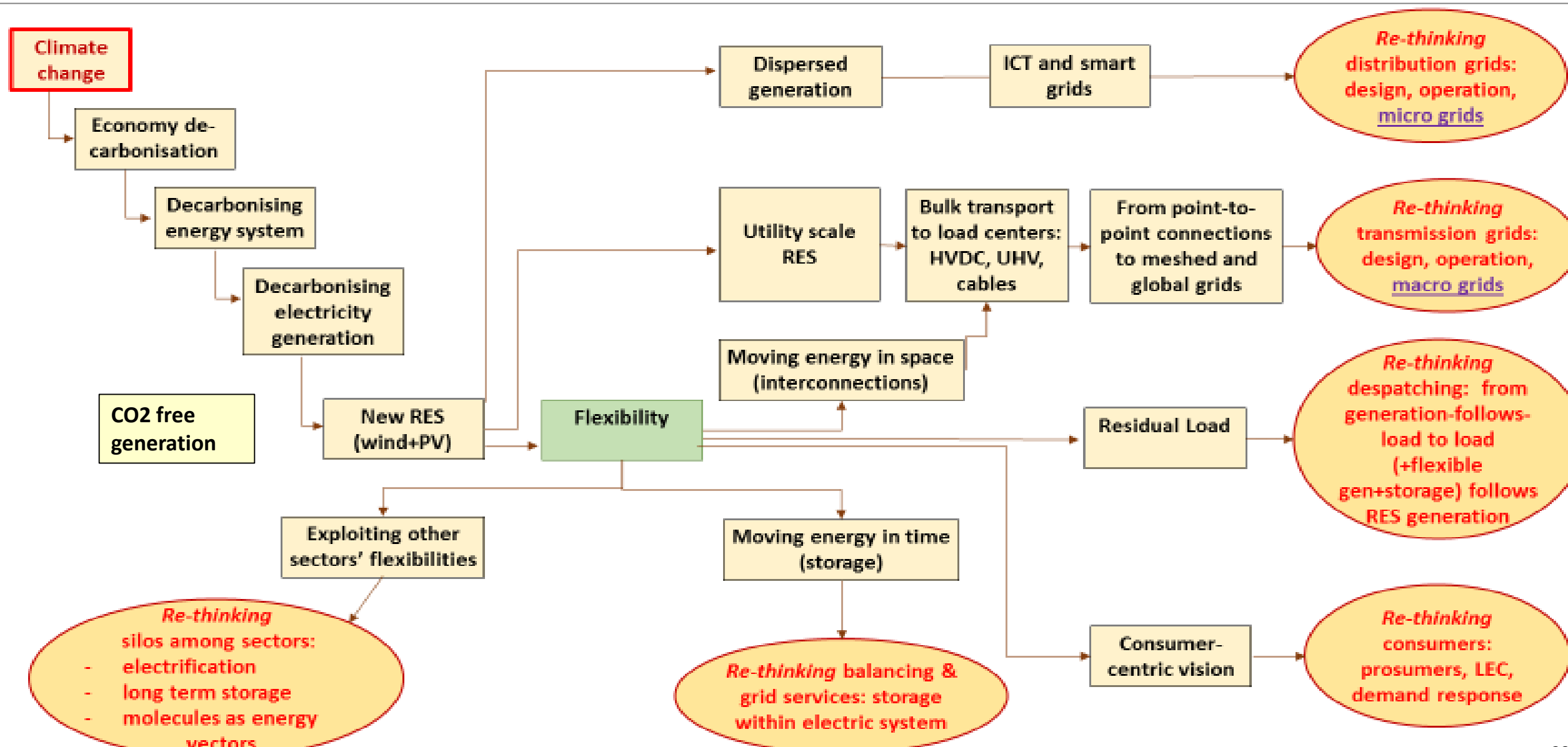


# ENERGY TRANSITION IMPLIES RETHINKING MOST OF LEGACY SYSTEM AND MINDSET





# Energy transition IMPLIES RETHINKING MOST OF LEGACY SYSTEM AND MINDSET



## Question for Christophe:

# Decision making for Energy Transition

The Energy Transition is unfolding amidst political and social pressures, not to mention emergencies (pandemic, warfare, commodity prices spikes, supply chain disruption). Will this environment allow investment and operational decisions to be taken in sound, robust, and equitable way or do we risk a hectic, uncoordinated pathway in front of us?

# Question 1:

## Mindset change

One extra challenge for successfully enacting sector coupling is a mindset change: understanding reciprocal needs, processes, constraints across sectors' actors, which is yet an unexplored territory; including of course different markets and regulations. What is your opinion?

## Question 2:

# Regulation

What is the role of Regulation, which was set-up mainly to introduce free market rules and a governance change in electricity generation and sales, to steer or at least enable the Energy Transition. Should it leave the initiative to private actors and innovation, with pilot projects, sandboxes etc., or should it lead in an anticipatory way (for example: in Europe regulation for hydrogen market, network and even network operators has been proposed already for public consultation)?

## Question 3:

# Market Design

Energy Economics and System Design including market design are a key component, together with technical issues, of the evolution from “simple” power system to an integrated energy system; which new methodologies/metrics/tools are needed to properly assessing and prioritising sector coupling projects/initiatives ?