



FORESIGHT ON DEMAND

Foresight towards the 2nd Strategic Plan
for Horizon Europe

Deep-Dive: Scenarios of an abundant Hydrogen Economy

3rd Workshop – Assessment of the raw scenarios

Agenda of today's meeting

Time	What
13:00 – 13:15	Warm up / log in / onboarding
13:15 – 14:00	Presentation by Ulli with interactive elements
14:00 – 15:30	Group work; 1) United States of Europe 2) Primacy of the cheap 3) Green Deal
15:30 – 16:00	Feedback, quick report from the groups Next steps

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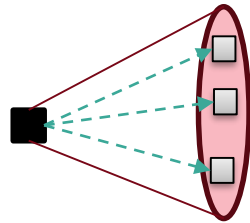
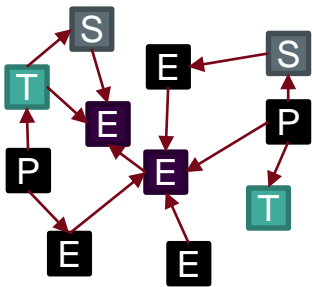
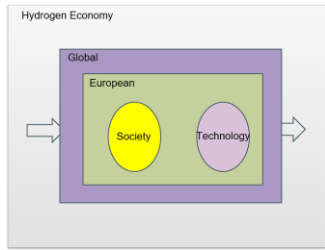
Audience Q&A Session

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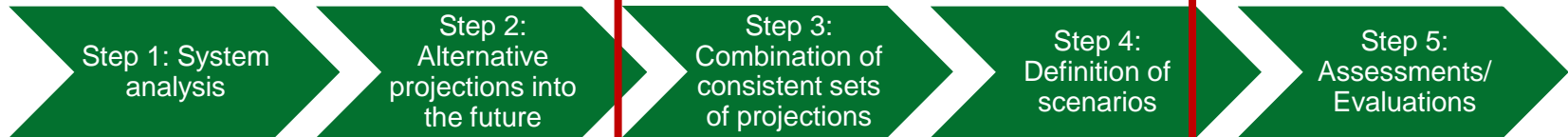
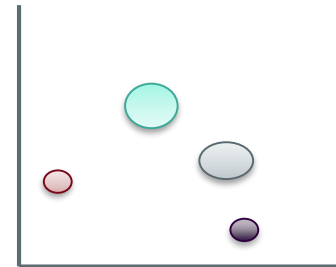
SCENARIOS OF ABUNDANT HYDROGEN ECONOMY

Title of the Scenarios	Hydrogen Economy in Europe 2040
Geographical Scope	Europe 27 - Embedded in a global context
Time Frame	2040
Purpose of the scenarios	<p>The aim is to develop positive Scenarios: How does Europe look like, when there is abundant fuel (H₂) available?</p> <p>The exercise is exploratory and open; in the first stage.</p> <p>How can and must European R&I policy support the transition? Where are the obstacles, drivers and barriers?</p> <p>Are we in the risk to run in lock-in-effects? How to prepare the context for the energy transition? Which developments support and hinder the transition?</p>
What's in	The socio-economic, socio-technical socio-environmental developments inside and outside Europe that are influenced by a Hydrogen economy and that influence themselves the transition towards the Hydrogen economy.
What's out	<ul style="list-style-type: none">• Technical details of hydrogen technology, including e.g. electrolyzers, fuel cells, transport details and alike.• Worst case scenarios.

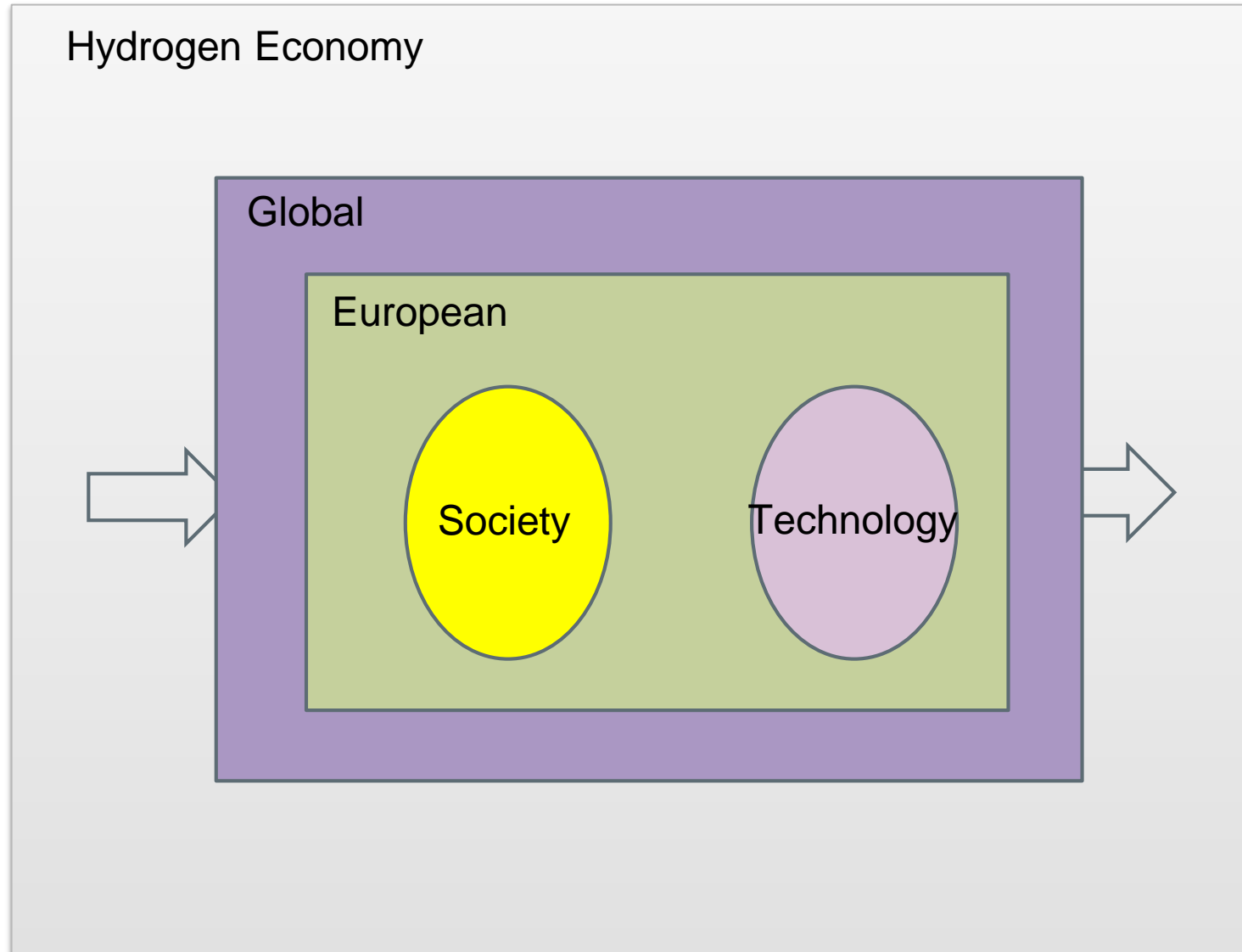
HOW TO (SYSTEMATICALLY) THINK ABOUT THE FUTURE? BASIC STEPS OF DEVELOPING SCENARIOS.



Scenario 1
Scenario 2
Scenario 3



SYSTEM ANALYSIS – SELECTION OF KEYFACTORS

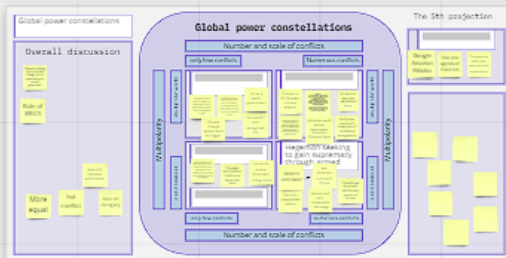


FINAL LIST OF KEY FACTORS AFTER THE DISCUSSIONS

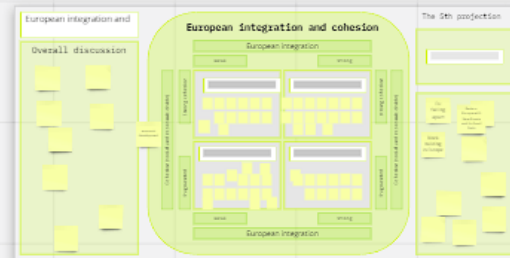
Global	European	Society	Technology (without Hydrogen)
1 Global power constellations	2 European integration and cohesion	5 Values, preferences and sustainability of lifestyles	6 Organisation of energy systems
4 European and global policy	3 Degree of autonomy and self-sufficiency in Europe		

Building projections

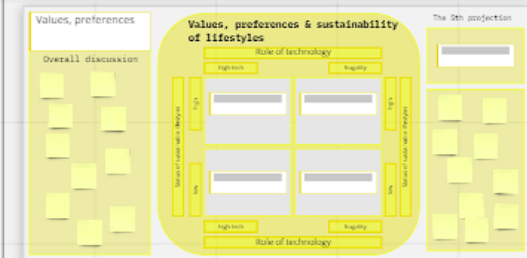
(1) Global power constellations



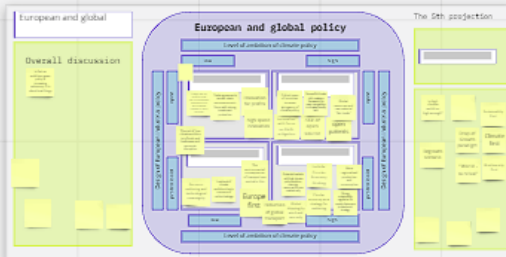
(2) European integration and cohesion



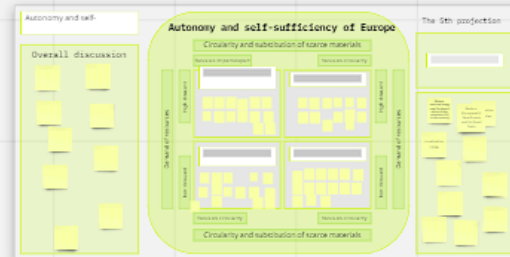
(4) Values, preferences & sustainability of lifestyles



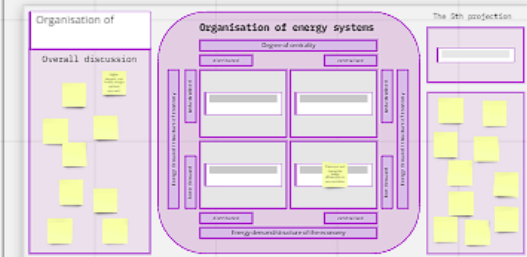
(5) European and global policy



(3) Autonomy and self-sufficiency of Europe



(6) Organisation of energy systems



(1) Global power constellations



Characterisation

This factor describes the constellation and distribution of political and economic power on a global scale. For years, after the Second World War and during the Cold War, there was a clear bipolarity. With the break-up of the Soviet Union, the growth of the European Union, and the growing role of BRICS countries, the power constellations have changed. This has (had) a notable effect on global trade, access to raw materials, conflict and migration.

Possible future developments (projections)

A multi polar world with a functioning multilateral system – a UN dream come true

The world is peaceful and cooperative with a globally recognised United Nations as a sort of world government. Finding ways together to cope with climate change and other global threats helped to unify nations worldwide.

Multipolarity with major confrontations between superpowers

Western dominance declined due to internal conflicts within the US. Russia and China have formed an alliance. Various centres of power emerge around India, Brazil and South Africa provoking hot wars, cyber warfare and terror, mostly on a local level. In general, the world is full of conflict.

China is the economic and technological leader

China managed to take over world leadership in economy and technology. Western countries are cooperating but China determines the rules. The **US** is focusing on its own territory. Trade, economic interest but also cooperation concerning tackling climate change are high on the global agenda.

Hegemon seeking to gain supremacy through armed conflict

The world is full of conflict and tension. Russia re-formed a new Soviet Union in cooperation with China and India. Europe has no option but to tolerate this development and is loosely cooperating to avoid any armed conflicts. The US is thrown back and several placeholder conflicts are happening on the African continent.

The private companies as a world government projection

Google, Amazon, and Alibaba dominate the world. They have their own security and supervision installations. As they have more financial power at their disposal than single nations, they control policy.

The business-as-usual projection

The US and the western countries (G7) remain economic and technological leaders in the world. China and Russia seek to cooperate with one another and there are multiple agreements in place to ensure that conflicts remain few.

(2) European integration and cohesion

Characterisation

This factor reflects the status and the constitution of the European Union. A crucial indicator of that is the efficiency of European institutions and along with that, the degree to which they are acknowledged by the – rather diverse – Member States. Next to nationalistic tendencies, there might be strong disbalances in terms of economic power and wealth throughout the different countries. Which role do national governments play and how recognised is the European Commission amongst them?

Possible future developments (projections)

European trade union

Back to the early beginnings of the cooperation of European countries. There is a clear focus and interest of European countries to (exclusively) cooperate economically. The various policy domains are subordinated to trade and economic interests. Each Member State is autonomous and politically independent.

The United States of Europe

Europe cooperates politically and economically in a very integrated way. There is a common policy for all political domains, including foreign affairs and security. The European Commission carries out the role of a European government. Compared to today, there are more associated countries. Members include the Balkans and the Black Sea region.

Eurexit - Europe gets divided

A sort of Brexit happened to nearly all European countries. There is no such thing as a common policy. The countries cooperate based on a series of bilateral agreements which gives more power to national governments. In most cases, decisions are more effective and efficient.

Party of the willing

There is a strong coalition of selected European countries which delegate a common policy to the European Commission. Due to the decreased size, political decisions get more effective and efficient; bureaucracy is reduced. After Brexit other countries followed, creating a small group of countries cooperating intensively in all political domains and a larger group of associated, loosely cooperating countries.

The business-as-usual projection

The policy of the EU Commission is ambitious. Nonetheless, the administrative apparatus is large and slow in decisions. Single countries can block decisions. The interests of various countries vary significantly. Despite that, Europe is internationally strong and the common policy is still effective.



(3) Autonomy and self-sufficiency of Europe



Characterisation

To what extent Europe can be autonomous and self-determine its aims as well as means of implementing them, depends on its self-sufficiency, meaning its ability to provide everything it needs to sustain itself. A critical determinant in this is its access to resources, such as technology, human capital, and raw materials amongst others. While Europe is rich in resources, technology and knowledge, certain technologies critically depend on specific raw materials. Many of which are not available in Europe.

Possible future developments (projections)

European ecovillage – self-sufficiency without circularity

Europe has a strong focus on autonomy and self-sufficiency. The focus lies on available raw materials and assets in Europe. Trade is often regionalised. Global trade is minimised and life hence “simplified”.

The autonomous R-society – autonomy and circularity

Material cycles are mostly closed and the material turnover is strongly reduced. Following the concept of circular economy, R-strategies are applied on all levels. Consequently, the input of new raw materials is barely necessary. Europe is widely autonomous and self-sufficient. Export is therefore kept to a minimum. In recent years many raw materials, especially metals, have piled up in built infrastructures and recycling technologies have advanced significantly.

Throughput society – high level of dependence and (almost) no circularity

Circularity is barely relevant. The whole economy follows the principle of efficiency and cost-effectiveness. Respectively, trade of all kinds of goods, raw materials and secondary raw materials plays a major role, as long as global markets function and prices are deemed acceptable.

Technology transfer and cooperation – interdependence and circularity

Europe is technologically advanced and applies recycling as well as other R-means. The economy is strongly based on research and innovation and the transfer of technology. Goods and raw materials are imported and exported. This share of labour creates high efficiency but also dependence on neighbouring countries.

(4) Values, preferences & sustainability of lifestyles

Characterisation

This factor encompasses values, attitudes, and lifestyles in Europe concerning sustainability and its different components. The discourses range from technology affinity to frugality and “back to nature”. Depending on the organisation of a society, wealth and buying power will play a key role.

Possible future developments (projections)

Sustainable lifestyles based on frugality

Frugal technology does not inevitably correlate with “cheap” (as in low-quality) technology and frugal technology does not automatically hinder sustainable high lifestyles. Local, appropriate and affordable technologies should be utilised to achieve high-quality sustainable lifestyles which would allow all sectors of society to improve their way of life. The emphasis is very much on the quality of life and the need to reach out to the middle class and poorer citizens. This may mean having to adapt certain habits on a societal level (e.g. travelling less, changing consumption patterns, etc.)

High technology for a sustainable life

High tech, constant innovations, new materials and digitalisation help to achieve energy and material efficiency which in turn relieves the pressure on the environment and supports healthy lifestyles.

The primacy of the “cheap” with little regard for sustainability

Sustainability is not the driving force. Nonetheless, people are highly focused on cheap products and the whole economy emphasises low prices and efficiency. High tech in most cases is too costly, which leads to a focus on frugal technologies in production and consumption.

Focus on high tech and profit with little regard for sustainability

The drive for high technology continues unabatedly, new products continue to be developed and consumed. There is little concern or change in attitudes and approaches to sustainable lifestyles. Consumption is status-driven and pragmatic. There is a feeling that technology will provide the answers to sustainability. Individuals see no need to change their lifestyles.

The business-as-usual projection – pragmatic consumption

Consumer decisions are pragmatic and price-oriented. There is a large divergence of wealth in European society and peoples’ consumption patterns are in alignment with their status, wealth and societal bubble.



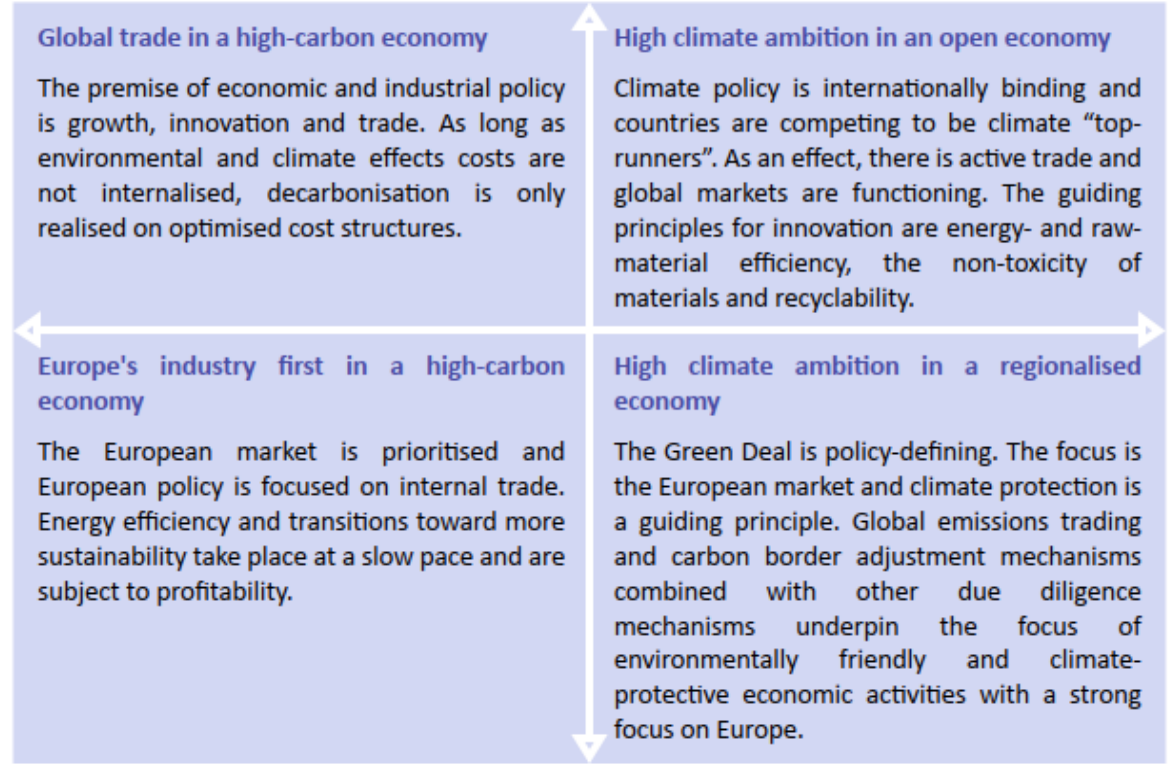
(5) European and global policy



Characterisation

In general, the European and global climate policy as well as the overall orientation of industrial and sustainability policy plays a key role in how to shape the energy future of Europe.

Possible future developments (projections)



Sustainability first at any cost projection

This political decision has created an extensive reconfiguration of the European economy. The former primacy of economic development and growth has now turned into the primacy of sustainability and climate protection. This caused large companies to struggle, many of which went bankrupt. This led to the consolidation and reorientation of markets.

(6) Organisation of energy systems

Characterisation

Not all countries have the same potential for renewable energy. There are different options for setting up an energy system for Europe based on renewable energy. One aspect is the way the (Pan) European Energy Network Grid, which provides gas and electricity, is organised and how energy is transported and distributed across Europe. While a form of energy autarky in rural areas is relatively easy to achieve in urban areas or close to industrial production sites, the provision of power is likely to be centralised and managed on a larger scale.

Also, the question of how countries cooperate with each other or to what extent they rely on imports of energy, be it fuel or electricity, can make a difference.

Possible future developments (projections)

The Pan-European Energy Network

Europe is mainly autonomous, based on a renewable energy system. The electricity and gas network will be fully integrated into a bi-directional energy system, taking care of the distribution of wind, water and solar power as well as fuels. Connected energy storage systems are buffering the fluctuations. Imports are barely necessary.

Countries take care of themselves

The pan-European energy distribution does not play a big role. Countries have a focus on national energy provision systems. There is a strong orientation toward imports, storage and reserves management systems.

Cooperation of neighboured countries (various cooperating clusters)

Different neighboured countries cooperate and build joined empowered grids and energy storage systems. Energy is imported mainly as fuel, only when necessary, and as a reserve. These are managed jointly. The potentials for renewable energy are utilised largely and intelligently to combine the strengths of the partner countries.

Price-based distribution systems

The whole energy system is optimised for trade and exchange, including Europe's neighbouring countries. As a result, there are high fluctuations in energy prices and storage systems, and an extended energy network has been empowered. Partly non-renewable energy is cheaper and entering the market, especially from neighbouring countries.



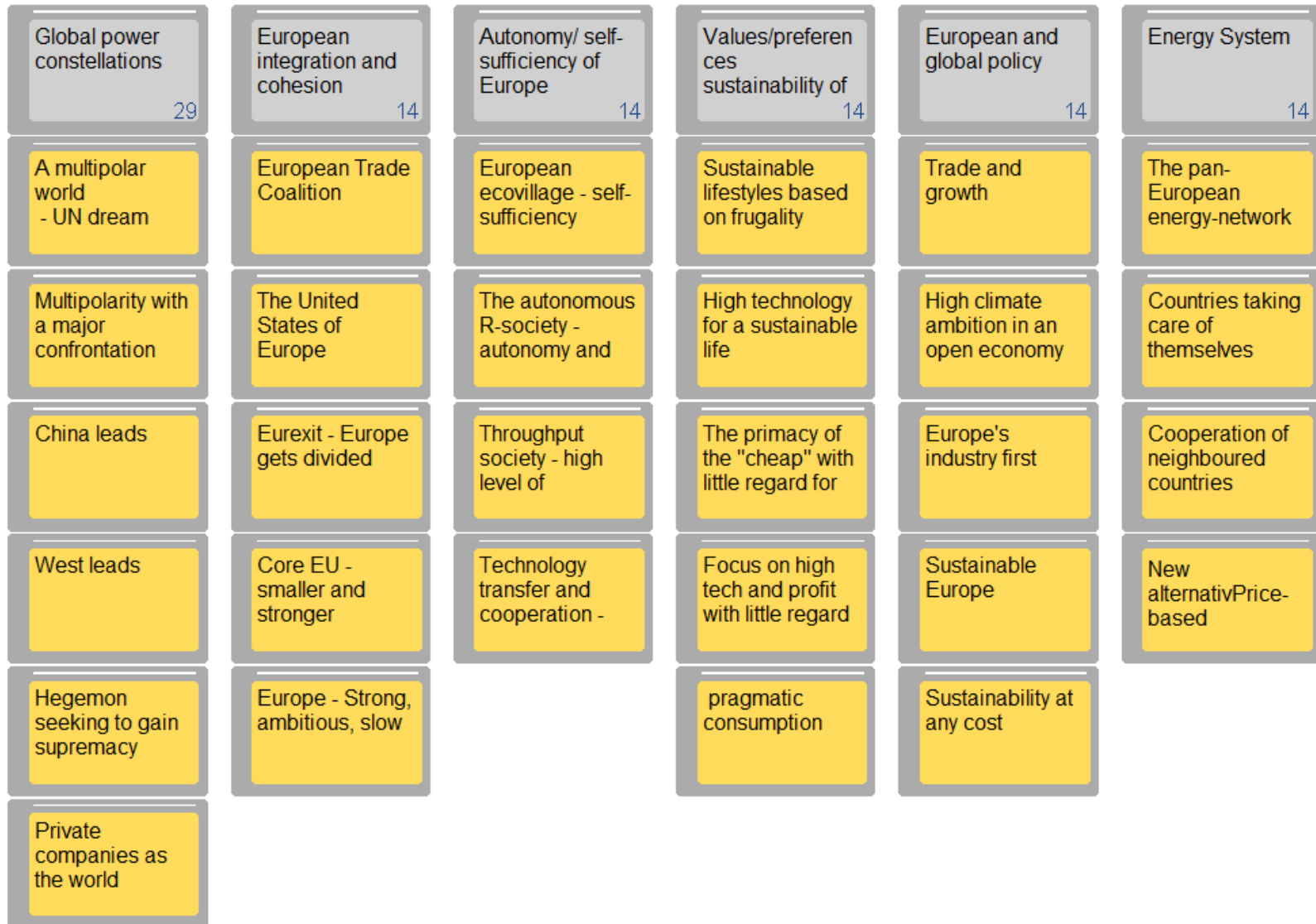
Link to the descriptions of the scenarios based on the projections:

<https://drive.google.com/file/d/10wVqixu2SkDd5luH9tSV-DlgGFsm0qsl/view?usp=sharing>

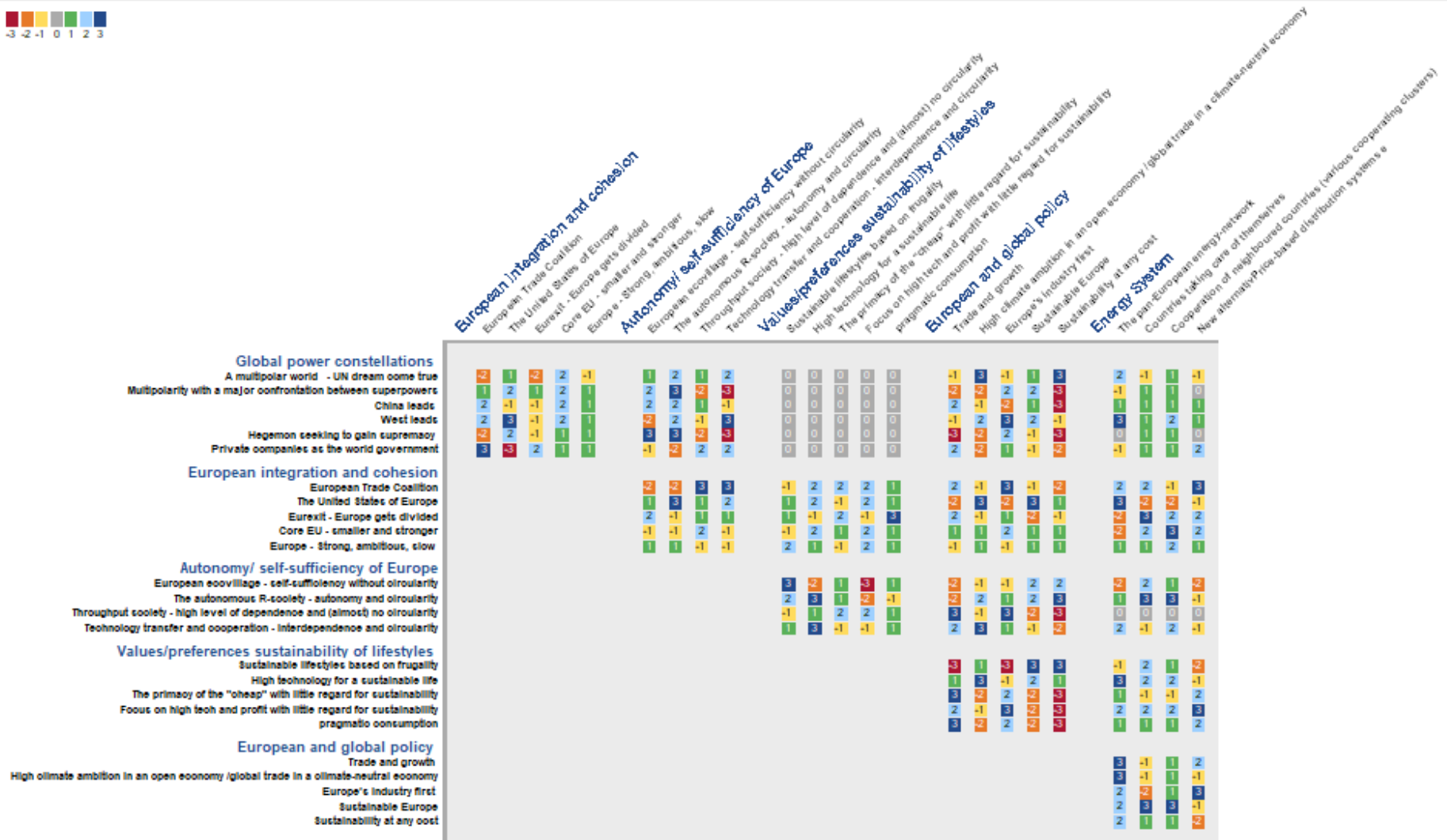
Link to the key-factor descriptions:

<https://drive.google.com/file/d/10xfKFRY7dESrHGGEY4xZFcLnFbHtckUd/view?usp=sharing>

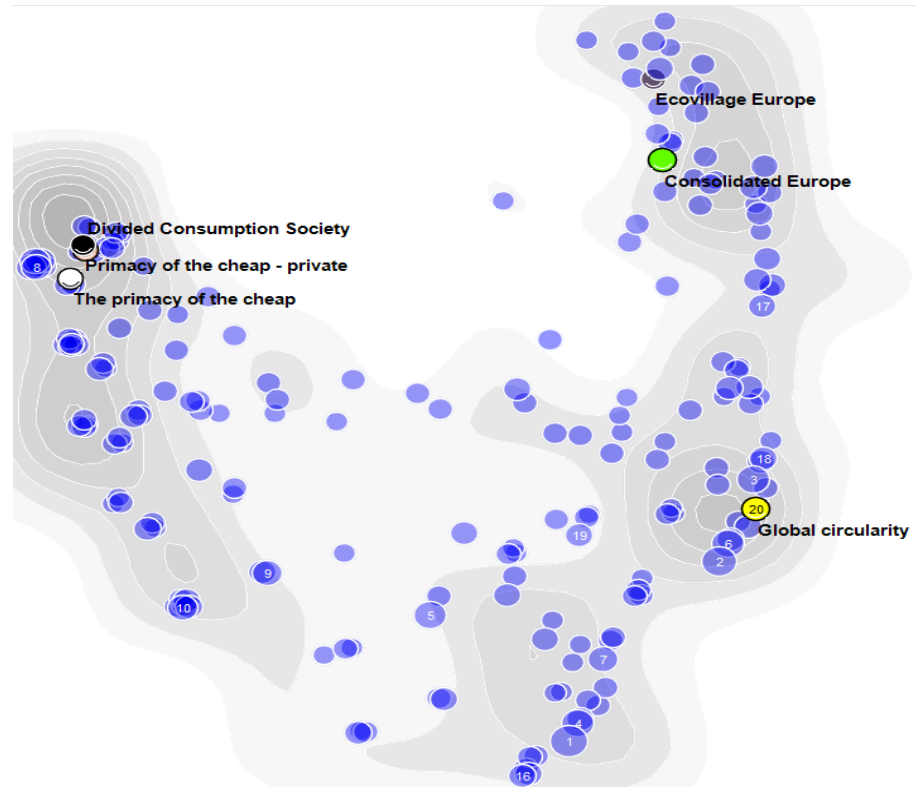
The full picture – the morphological box



Consistency check



The raw scenarios



The most consistent

Global power constellations 29	European integration and cohesion 14	Autonomy/ self-sufficiency of Europe 14	Values/preferences sustainability of 14	European and global policy 14	Energy System 14
A multipolar world - UN dream	European Trade Coalition	European ecovillage - self-sufficiency	Sustainable lifestyles based on frugality	Trade and growth	The pan-European energy-network
Multipolarity with a major confrontation	The United States of Europe	The autonomous R-society - autonomy and	High technology for a sustainable life	High climate ambition in an open economy	Countries taking care of themselves
China leads	Eurexit - Europe gets divided	Throughput society - high level of	The primacy of the "cheap" with little regard for	Europe's industry first	Cooperation of neighbored countries
West leads	Core EU - smaller and stronger	Technology transfer and cooperation -	Focus on high tech and profit with little regard	Sustainable Europe	New alternative Price-based
Hegemon seeking to gain supremacy	Europe - Strong, ambitious, slow		pragmatic consumption	Sustainability at any cost	
Private companies as the world					

The West leads (business as usual)

The US and the Western countries (G7) remain the global economic and technological leaders. China and Russia seek to cooperate with one another and there are multiple agreements in place to ensure that conflicts remain few.

The United States of Europe

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Technology transfer and cooperation – interdependence and circularity

Europe is technologically advanced and applies recycling as well as other R-means. The economy is strongly based on research and innovation and the transfer of technology. Goods and raw materials are imported and exported. This share of labour creates high efficiency but also dependence on neighbouring countries.

High technology for a sustainable life

High tech, constant innovations, new materials and digitalisation help to achieve energy and material efficiency which in turn relieves the pressure on the environment and supports healthy lifestyles.

High climate ambition in an open economy/global trade in a climate-neutral economy

Climate policy is internationally binding and countries are competing to be climate “top-runners”. As an effect, there is active trade and global markets are functioning. The guiding principles for innovation are energy- and raw-material efficiency, the non-toxicity of materials and recyclability.

The Pan-European Energy Network

Europe is mainly autonomous, based on a renewable energy system. The electricity and gas network will be fully integrated into a bi-directional energy system, taking care of the distribution of wind, water and solar power as well as fuels. Connected energy storage systems are buffering the fluctuations. Imports are barely necessary.

Most comparable to today...

Global power constellations 29	European integration and cohesion 14	Autonomy/ self-sufficiency of Europe 14	Values/preferences sustainability of 14	European and global policy 14	Energy System 14
A multipolar world - UN dream	European Trade Coalition	European ecovillage - self-sufficiency	Sustainable lifestyles based on frugality	Trade and growth	The pan-European energy-network
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Private companies as the world					

United states of Europe

Circularity with High-Tech – united world



United states of Europe

Circularity with frugality – conflicting world



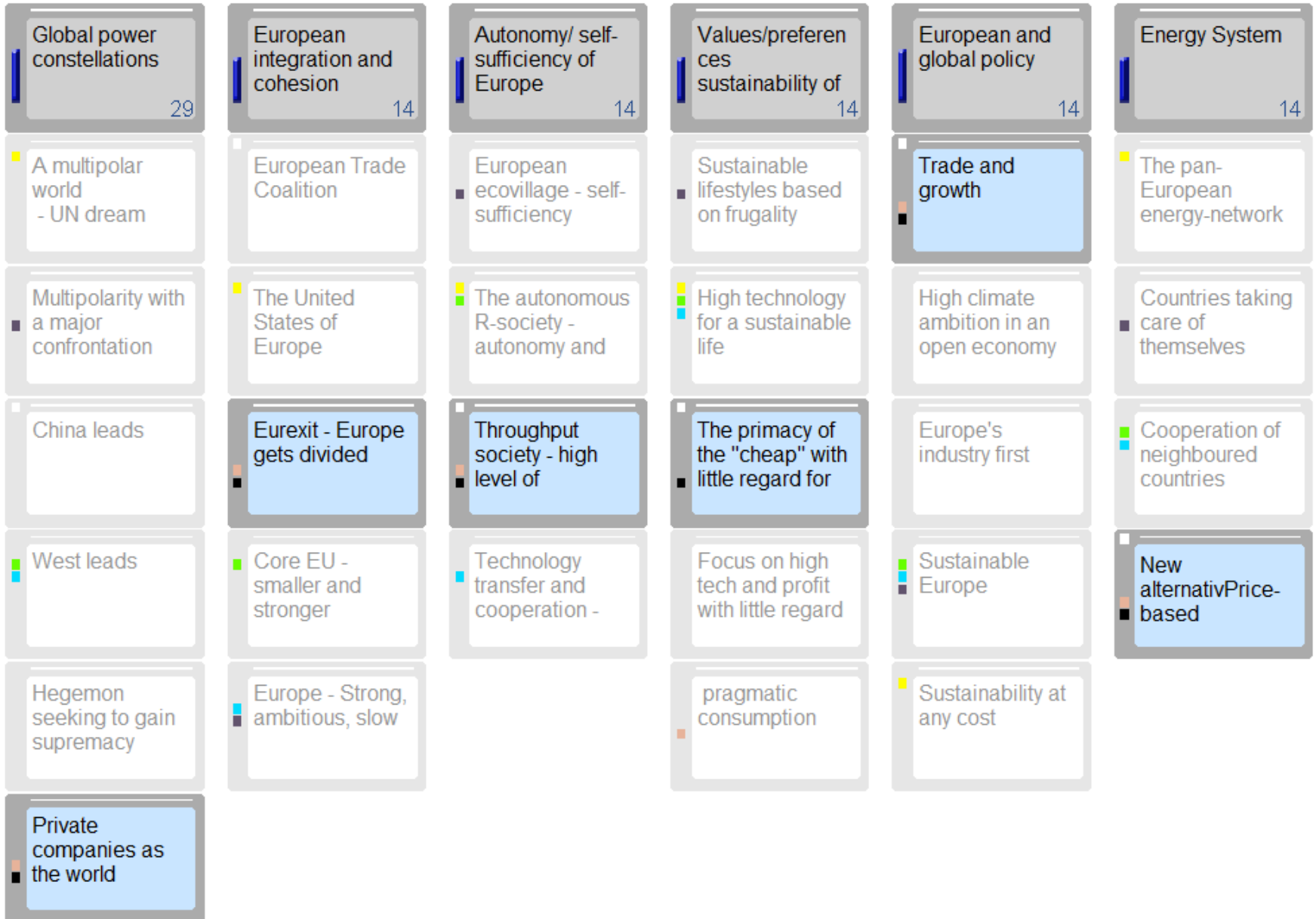
The Primacy of the Cheap

Led by China



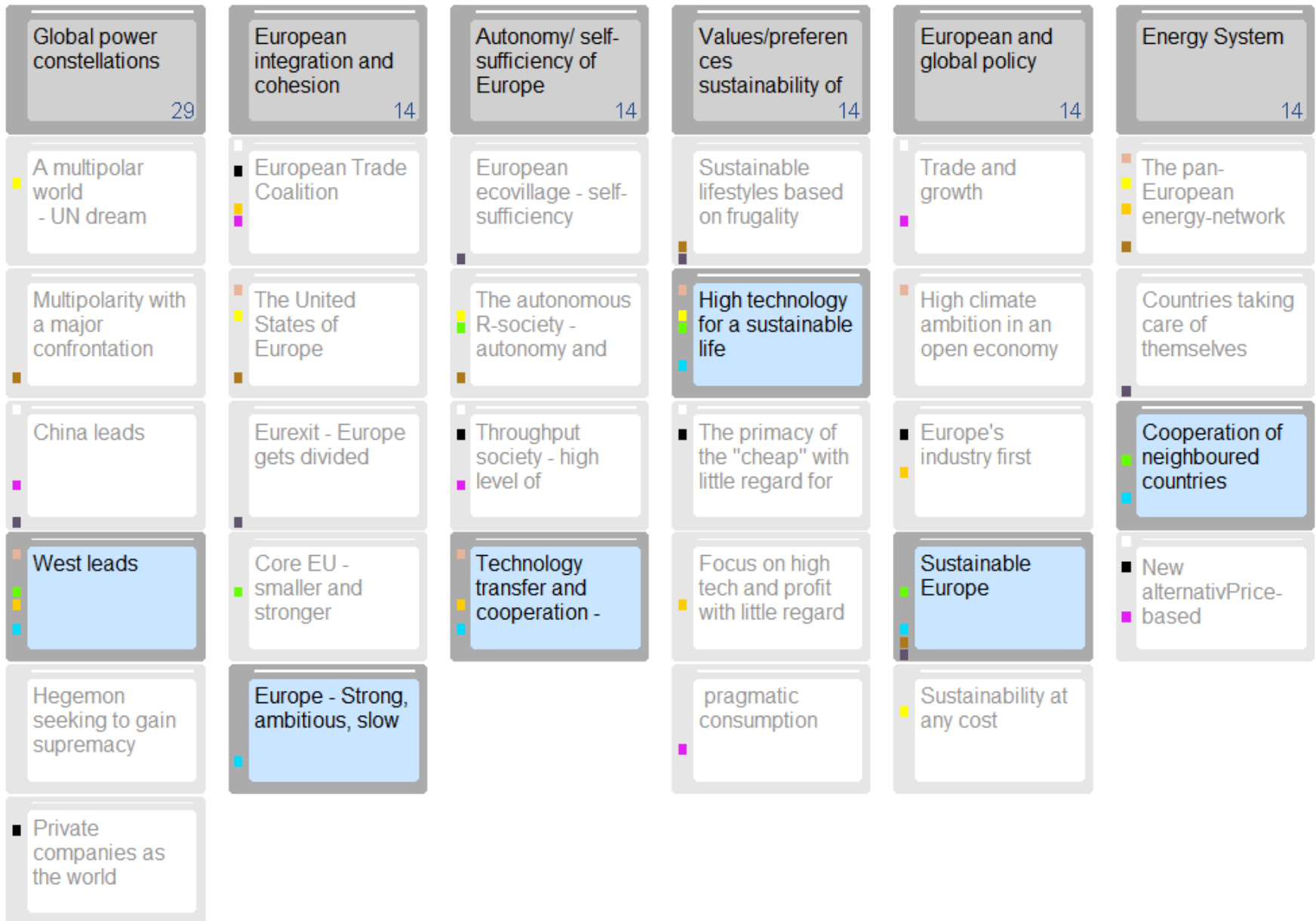
The Primacy of the Cheap

Led by private companies



Green Deal for Europe

In a western world



Green Deal for Europe

In a conflict world



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Audience Q&A Session

① Start presenting to display the audience questions on this slide.

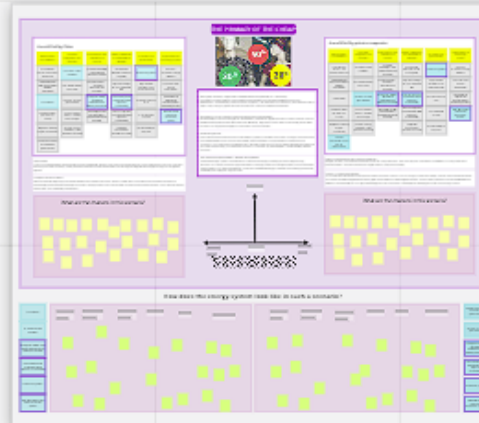
Let's go into Break-out groups:

Miro-Board: https://miro.com/app/board/uXjVPT_0X_w/?share_link_id=152445256565

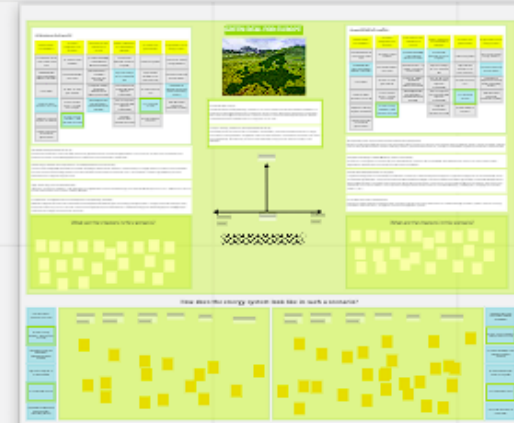
The United States of Europe



The Primacy of the Cheap



Green Deal for Europe



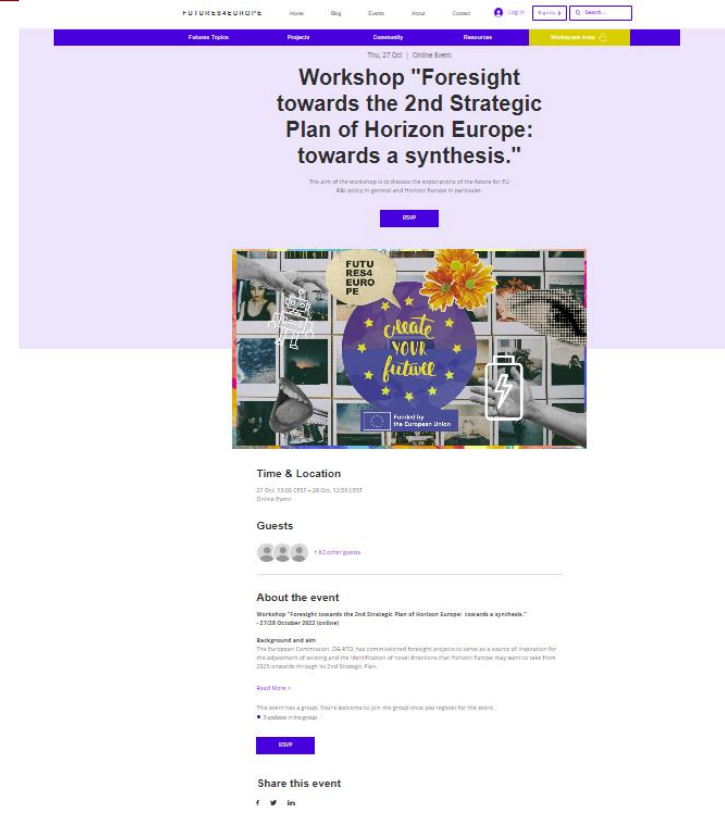
Objectives for the break.out session:

- **Better understand** the 2 sub-scenarios in the overarching topic. Do the rating; which scenario of the 2 is more desirable? Which is more far in the future?
Exchange/discuss => 15 – 20 min => find the chances in the scenarios
- **Work on the energy / Hydrogen System**
Try to identify commonalities/differences between the two sub-scenarios. Remember: “Abundance of green hydrogen in Europe 2040
- **Guiding questions:**
Where does the Hydrogen come from? Production/import? How will it be produced? From where will it be imported? What is imported? What are the challenges? What about industry? Still necessary? To what extend? What do the private people do? What infrastructure is needed? What about mobility?
=> be aware of the factor: Energy system and check whether import is possible

QUICK ROUND OF FEEDBACK

See you on 27-28 October

[https://www.futures4europe.eu/event-
details/workshop-foresight-towards-the-2nd-
strategic-plan-of-horizon-europe-towards-a-
synthesis](https://www.futures4europe.eu/event-details/workshop-foresight-towards-the-2nd-strategic-plan-of-horizon-europe-towards-a-synthesis)



The screenshot shows the event page for the workshop. The main heading is "Workshop 'Foresight towards the 2nd Strategic Plan of Horizon Europe: towards a synthesis.'" Below the heading, there is a sub-heading "This 27 Oct | Online Event" and a description: "The aim of the workshop is to discuss the exploratory of the future for EU 4th policy in general and Horizon Europe II in particular." There is a "Join" button. Below the text is a collage of images including a sign that says "FUTURES4 EUROPE", a sign that says "create your future", and a sign that says "Powered by the European Union".

Time & Location
27 Oct, 13:00 CEST - 28 Oct, 12:00 CEST
Online Event

Guests
+ 82 other guests

About the event
Workshop "Foresight towards the 2nd Strategic Plan of Horizon Europe: towards a synthesis."
- 27/28 October 2022 (online)

Background and aim
The European Commission, DG RTD, has commissioned foresight projects to serve as a source of inspiration for the development of existing and the identification of novel directions that Horizon Europe may want to take from 2023 onwards through the 2nd Strategic Plan.

Read More

This event has a group. You're welcome to join the group once you register for the event.
● Update in progress

Join

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