



# Wise Approaches to Energy Transition Uncertainties:

Global Futures, low-carbon possibilities, and  
motivations for early-movers

Zurich Conference

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*Transformative Scenarios*

# Currents of Radical Uncertainty (Today as in 2006)

We are already deeply in an era of volatility and transitions...



**Recent Crises have both amplified and illustrated these developments**

INTENSIFIED  
ECONOMIC  
CYCLES

POLITICAL  
AND SOCIAL  
INSTABILITY

FAULTLINES IN  
INTERNATIONAL  
ORDER

DEMOGRAPHIC  
TRANSITIONS -  
URBANISATION

CHALLENGED  
ENVIRONMENTAL  
BOUNDARIES

NEW  
TECHNOLOGIES:  
DIGITAL,  
WIND & SOLAR,  
GAS & OIL SHALE

**Every Strong Current generates Counter-currents...**  
- and you can't tell up front which will turn out stronger

*Ignoring this reality fundamentally weakens decision-making ("lazy strategy")*

*The "Scenario Mindset" broadens perspectives, and stimulates richer consideration of choices and their potential upsides and downsides*

*This is a means to an end – better decisions*

*Identify relatively stable expectations and critical uncertainties... and their consequences for investments & policy*



# Consequences: - Making Choices...

Seek to Minimise Significant Future Regrets across Possibilities

- Missed Opportunities
- Significant losses

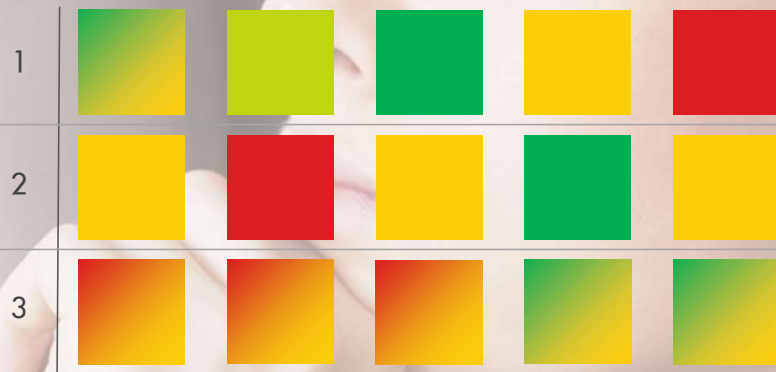
Examples:

Passenger Vehicle Manufacturer  
Global Energy Supplier

Opportunity:

Advantaged hydrogen-related developments

Future Scenarios



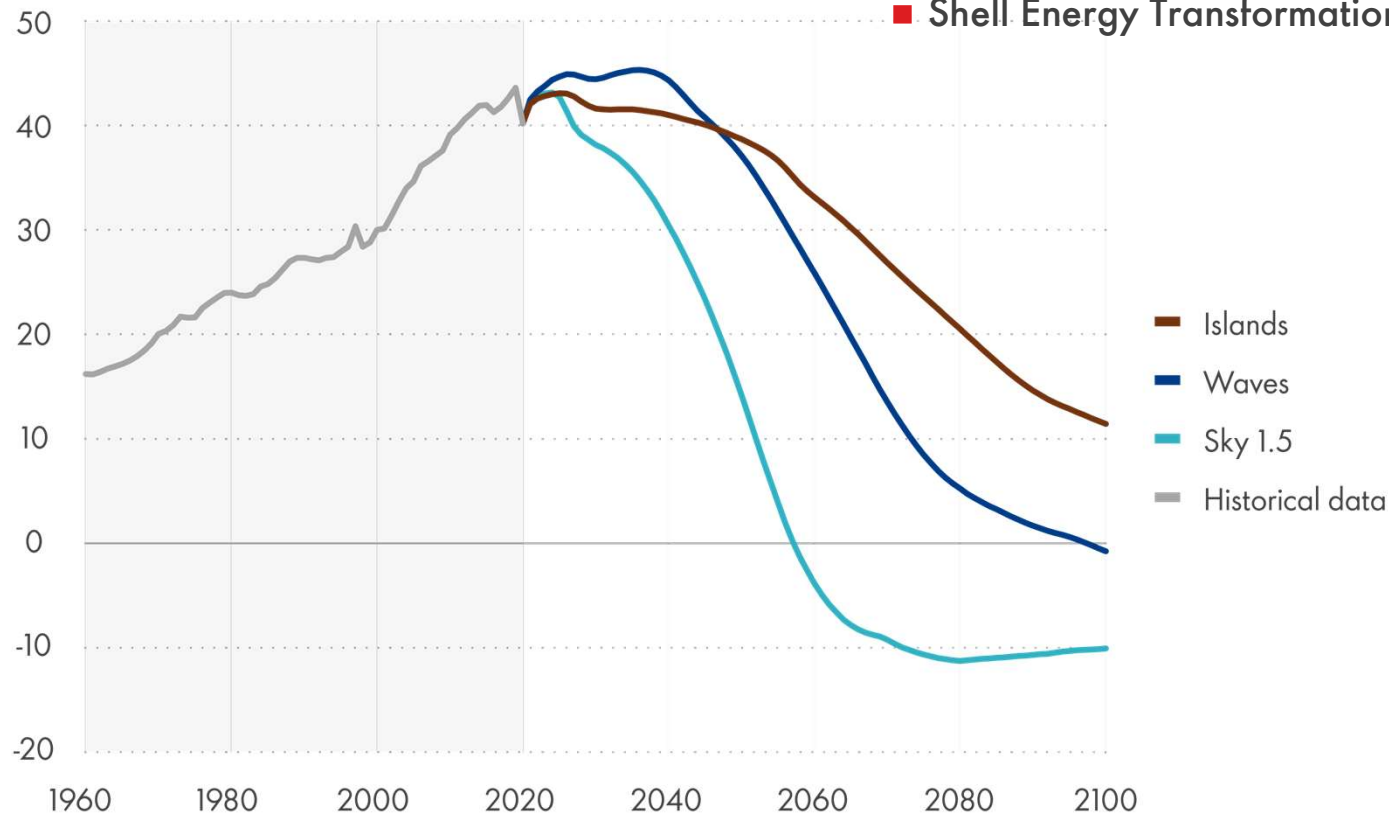
Choices



# Insights: All Outlooks Decarbonise - The Key Difference is When/How Fast...

## CO<sub>2</sub> emissions

Gt CO<sub>2</sub>/year



THE ENERGY TRANSFORMATION AND SECURITY SCENARIOS

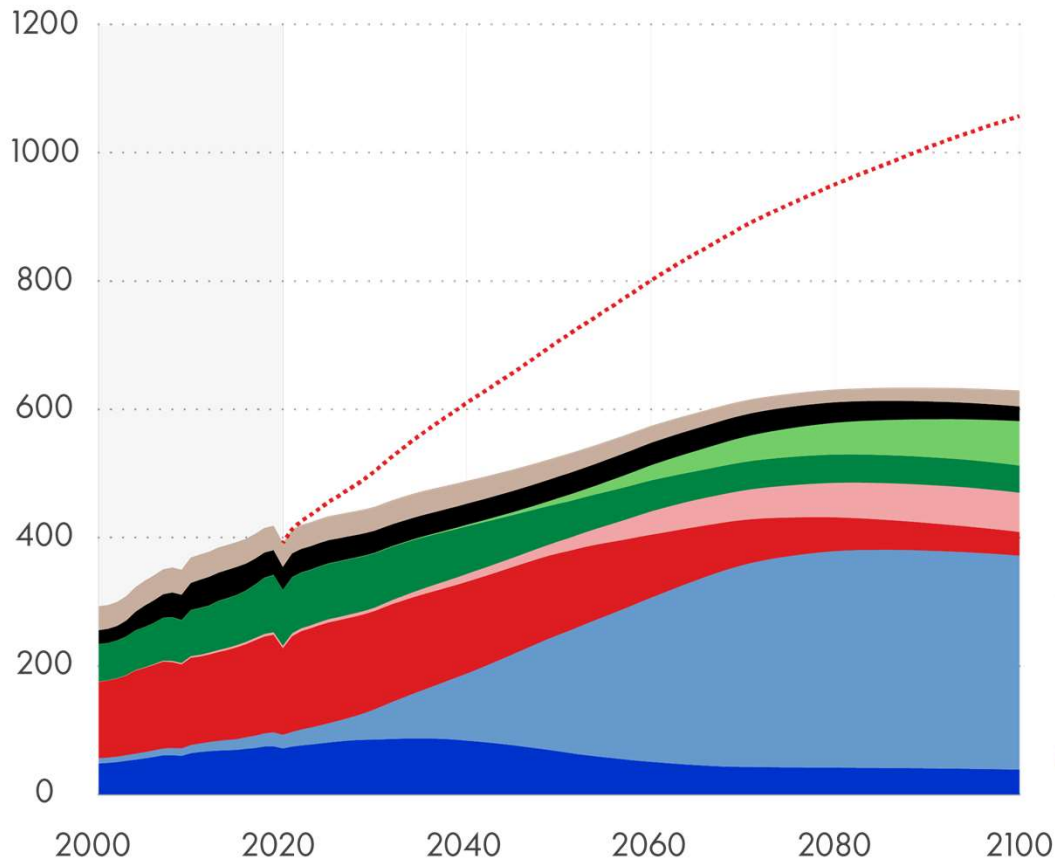
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Source: Shell analysis based on data from Global Carbon Project (2020) and the IEA (2020) World Energy Balances ([Link](#)), all rights reserved

Transformative Scenarios

# All Outlooks: Global Energy needs grow, with differences between regions and transition pace but with similar transition nature...

EJ/year (final energy)



**Impact of efficiency improvements**

**Gaseous fuels**  
shifting from fossil to non-fossil

**Liquid fuels**  
shifting from fossil to non-fossil

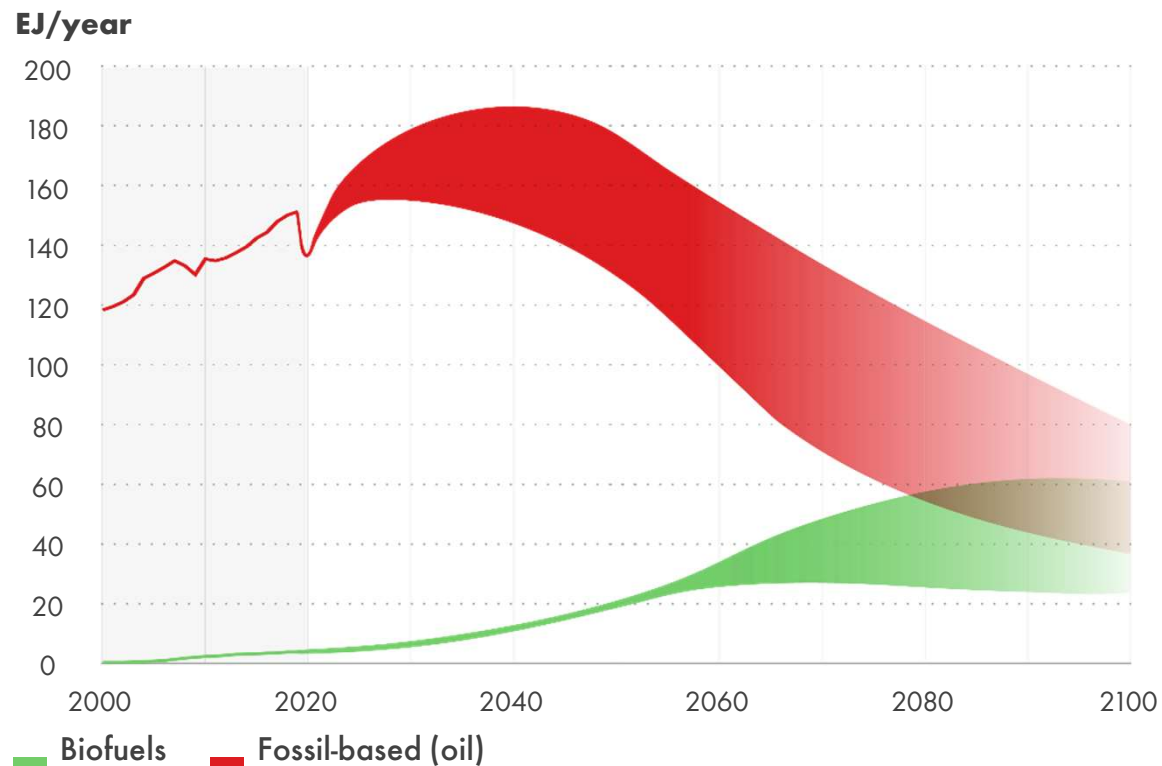
**Electricity consumption**  
predominantly from renewable sources

**Total final consumption of energy**

**- Sky 1.5 scenario**

# Global oil demand will peak within the next two decades, and decline as it is substituted by electricity, biofuels & gaseous/hydrogen fuels

## Global Liquid fuels demand

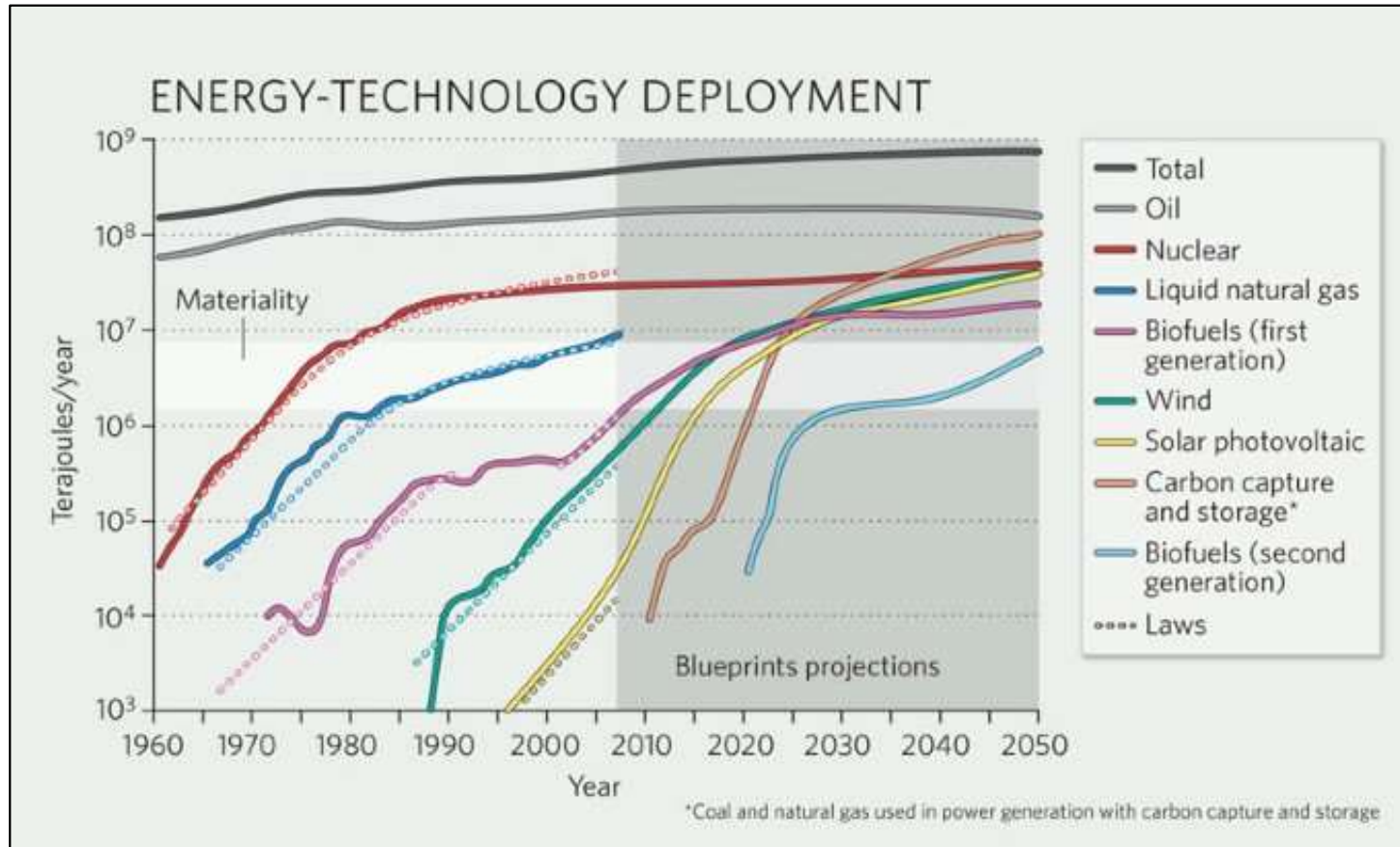


**“Just Stop Oil” slogan actually means “Punish the Poor”**  
**Should be: “Just Substitute Oil – and balance Supply responsibly”**

Source: Scenario ranges from Shell analysis based on data from the IEA (2020) World Energy Balances



## Learning more from the “pace” of Energy Transitions...



### “Laws”:

1. ~ 3 decades of explosive growth required to reach global materiality
2. Position in the long-term mix driven by final economics, social attitudes and uses



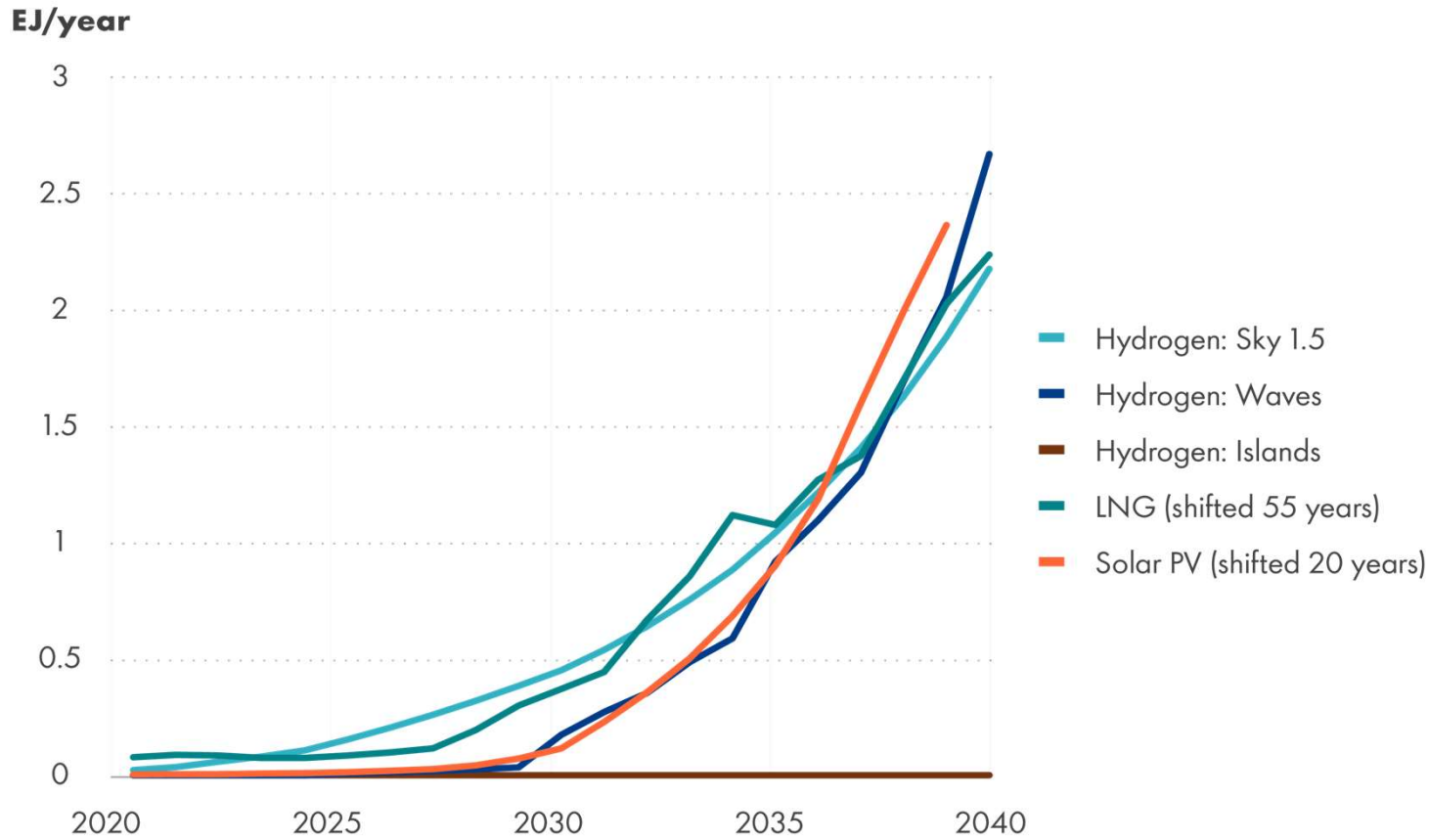


## Take-off growth can be “explosive” once it emerges

- This is driven by **competitive dynamics** as an industry equilibrium “flips”
- The “flip” comes from “Fear of Missing Out” once a pioneer demonstrates the prospect of an advantage, particularly in an already competitive space
- Pioneers & Forerunners ignite the growth “rocket”
- Fertile ground for pioneering can be prepared
- However, most standard financial evaluations mishandle uncertainty and under-recognize this economic opportunity

# Potential analogies for scaling hydrogen success: LNG and solar PV

## Hydrogen growth vs historical trends

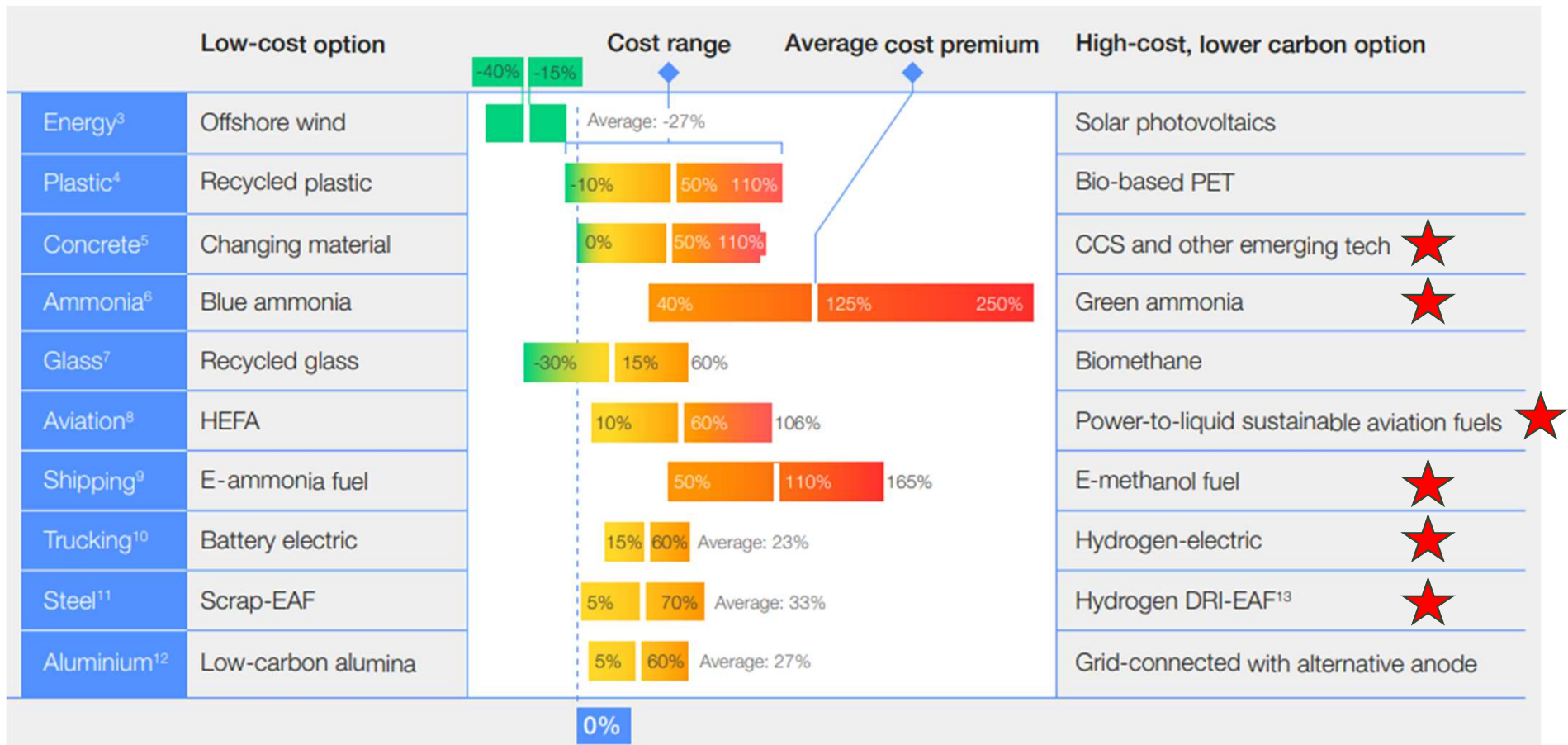


Source: Scenario ranges from Shell analysis based on data from the IEA (2020) World Energy Balances, all rights reserved



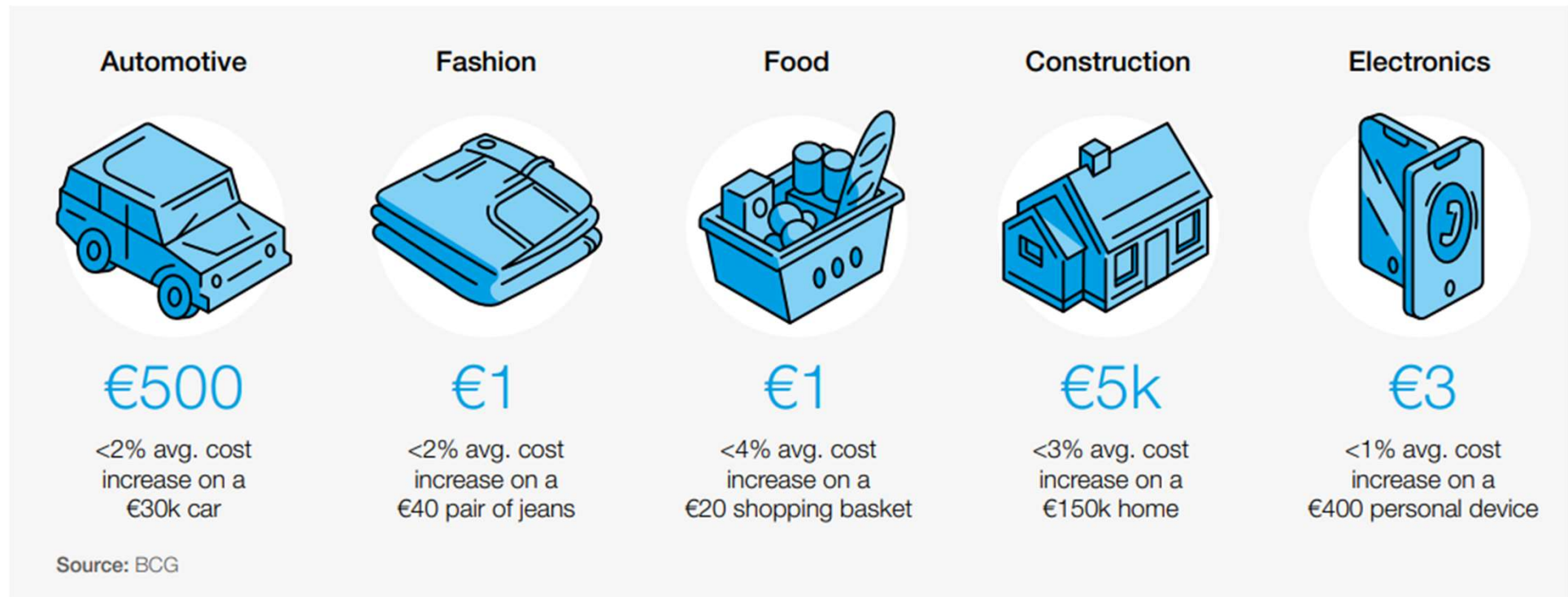
# A Challenge – large cost premia in commoditised activities

Potential Hydrogen uses ★



Source: BCG/WEF report, January 2023

## Encouragement: Decarbonised supply-chains would add only modest costs to final products – well in the range accessible to premium segments



The new business opportunity is to connect potentially available downstream premia to fund the high-emissions upstream activities in the supply-chain like steel manufacture



# Choosing to be a Forerunner or a Regular Follower...



Strategy	Scenario		
	Early Take-off	Late Take-off	No Take-off
Commit Early (Forerunner)	+++ (potential)	+ (potential)	-
Commit Late (with masses)	0	0	0
Avoid investment	---	-	0

Particularly when steps are carefully chosen, the “regret” from delayed returns may often be modest compared to the “regret” of missed opportunity



# Lessons from history, past transitions & future scenarios

Major changes take time,  
but there are Action Accelerators

**Alignments:**  
Policies, sectors,  
customers

**Smart policy  
rules and  
incentives**

**Pioneer  
leaders**  
(who see “Carrots”  
as well as “Sticks”)

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