SHAPE

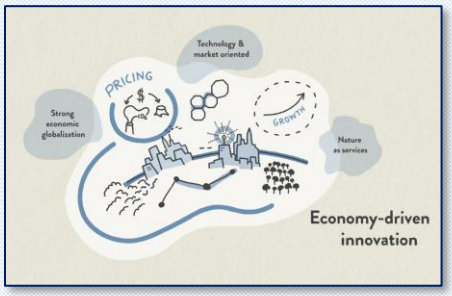
Sustainable development pathways achieving Human well-being while safeguarding the climate And Planet Earth

Fact Sheet:

Key assumptions of the SDP scenarios

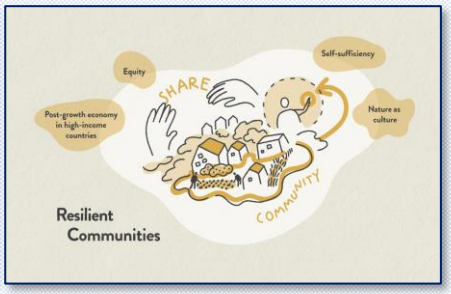
The SHAPE Sustainable Development Pathways (SDP scenarios) outline pathways to reach the internationally agreed 2030 Agenda's SDGs and the 1.5°C Paris climate target. They spell out alternative storylines that ***address the 2030 Agenda and climate action holistically****, and are translated into quantitative scenarios* ***using integrated assessment models*** *(IAMs). Short descriptions of three SDP scenarios, their key assumptions that were quantified for the modeling and how they compare to an exemplary trends-continued scenario can be found in the following.*

ECONOMY-DRIVEN INNOVATION



Economy driven innovation (EI) towards sustainable development: *In this world, liberal, functional, and global world views become prevalent. Societies embrace innovation, efficiency, global action and equal rights as key elements to depart from current unsustainable trends and drive the transition towards sustainable development.*

RESILIENT COMMUNITIES



Resilient communities (RC) achieving sustainable development: *This world develops towards community-oriented world views, emphasizing solidarity and wellbeing. Societies emphasize regional diversity, transcend the growth focused economy model and rely on equitable sharing of resources and economic wealth to ensure sustainable development.*

MANAGING THE GLOBAL COMMONS

Illustrations by Elsa Wikander / Azote

Managing the global commons (MC) to ensure sustainable development: *In this world, global norms and the perception of global citizenship become prevalent. States and global institutions orchestrate the transition towards sustainable development, including an increased focus on human services and decreased emphasis on material consumption.*

	SDP scenarios			Comparison
Key assumptions	**ECONOMY-DRIVEN INNOVATION**	**RESILIENT COMMUNITIES**	**MANAGING THE GLOBAL COMMONS**	**SSP2-NDC[1]**
Population	Optimistic (i.e. lower) assumptions regarding population growth (taken from SSP1[2])			Continuation of recent historical trends
ARCHITECTURE OF GLOBAL GOVERNANCE & SOCIETY AND GOVERNANCE				
Policy instrument	Economic (pricing, subsidies, etc.)	Price-based plus behavioral (e.g.,	Mix of regulatory instruments (standards, labels,	Regional, in line with NDCs

[1] SSP2-NDC describes a scenario where social, economic and technological trends do not shift remarkably from observed historical patterns (O'Neill et al. 2017). It assumes that the Nationally Determined Contributions (NDCs) for climate mitigation are achieved.

[2] SSP1 is one of five Shared Socioeconomic Pathways (SSPs) described in O'Neill et al. (2017). SSP1 describes a sustainable path that the world takes, including a relatively low population due to improved education and health investments.

		demand for more efficient products)	etc.) and economic	
Regionally different social and policy innovation deployment (e.g., uptake of carbon pricing across countries)	Regional	Regional	Global	Global
Level of technological innovation	High	Medium	High	Medium
Regionally different technological deployment	Global	Regional	Global	Global
Trade Flows	Globalized	Regionalized	Globalized	Globalized
ECONOMY, GROWTH, INEQUALITY AND FINANCE				
GDP/capita	High in all regions; Medium to strong regional convergence	Post-growth with gradual convergence to zero growth *in high-income countries*; Medium to high growth in other countries; Strong regional convergence	Moderate in high-income countries; High in other countries; Strong regional convergence	Continuation of historical growth and convergence patterns
Reduction of income inequality within countries	Fast; (Low inequality compared to trend scenario)	Extremely fast; (Very low inequality compared to trend scenario)	Very fast; (Medium level of inequality within SDPs)	Continuation of recent historical trends
FUTURE OF WORK				
Service sector share of GDP	High	High; Some regional differentiation	Medium	Medium
SUSTAINABLE PRODUCTION AND CONSUMPTION				
Availability of low-carbon technology such as CCS and hydrogen-based steel production	Very high	High	Very high	High
Rate of recycling (steel, aluminium, paper, plastic)	High; Based on advanced separation processes	Very high; Labor-intensive recycling in LIC[3], LMIC and advanced methods in HIC	High; Labor-intensive recycling in LIC, LMIC and advanced methods in HIC	Medium
Conversion and end-use efficiencies (energy & material)	High	Medium	Very high	Medium
LAND & FOOD				
Afforestation	High carbon sequestration potential through managed plantations; land availability is restricted	Low carbon sequestration through afforestation; instead, natural regrowth on abandoned land	Medium carbon sequestration potential through afforestation with restricted human intervention and land availability	Afforestation targets according to the NDCs

[3] LIC = Low income country, LMIC = Low and middle income countries, HIC = High income countries

Calorie intake	Increased calorie intake (overcoming hunger and rising over-nutrition)	Transition to healthy calorie intake (overcoming hunger and overnutrition) by 2050	Transition to healthy calorie intake (overcoming hunger and overnutrition) in the course of the second half of the 21st century	Increased calorie intake (decreasing undernutrition and rising overnutrition)
Dietary patterns	Partial substitution of livestock products with animal-free alternatives	Fast transition to sustainable and healthy diets (according to EAT-Lancet Commission)	Medium-paced transition to sustainable and healthy diets (according to EAT-Lancet Commission)	Continued nutrition transition towards livestock products and processed foods
Food waste reduction	Minor decrease in food waste	Strong decrease in food waste	Medium decrease in food waste	Food waste increases with economic growth
ENERGY				
Bioenergy	Price based	Limited to 60 EJ from energy crops (rainfed only)	Limited to 100 EJ from energy crops (rainfed only)	Price based
Carbon Capture and Storage (CCS)	High	Medium	Medium	Price based
Direct Air Carbon Capture and Storage (DACCS)	Available, price based	None	Available, price based	None
Most prominent type of electricity production technologies[4]	Large scale; Centralized	Small scale; Decentralized	Mixed	–
Hydropower Acceptance	High	Low	Medium	–
Nuclear Capacity	High	Low	Low	–
Hydrogen Capacity	High	Low	High	–
Energy Demand Level Buildings	Price driven / High	Low	Medium	Price driven / High
Energy Demand Level Transportation	High; Some regional differentiation, including megacities	Low; Distributed cities	Medium; Significant regional differentiation	High
Energy Demand Level in Industry	High	Low	Medium	High
WATER				
Environmental Flow Protection (e.g., restricting irrigation water withdrawal)	100% by 2050	100% in the course of the second half of the 21st century	100% by 2050	No protection of environmental flow requirements
BIODIVERSITY & ECOSYSTEMS				
Protection of terrestrial ecosystems	Strong; Focus on carbon sequestration and price-based policy instruments	Medium; Focus on biodiversity and regulatory policy instruments	Co-existence; Focus on biodiversity in *managed* landscapes and in vulnerable habitats; mix of policy instruments	Current protected areas plus avoided land conversion according to the NDCs

[4] Decentralized implies a focus on rooftop photovoltaic and onshore wind. Centralized also allows Concentrated Solar Power (CSP) and offshore wind, as well as other renewables.

HEALTH & EDUCATION				
Covered implicitly in the models via other key assumptions such as population, air pollution and nutrition				
MOBILITY				
Private ownership of cars	Low; Shift to other means of high-tech transport	Medium; Regional differentia-tion reflecting current patterns; declines in HIC[5] urban areas, expansion in LIC, LMIC to achieve a moderate level of convergence	Low; Significant integration of public transport and shared mobility systems	Medium
URBANIZATION				
Share of urban population	High	Low-medium	High	High
Global residential building floor space	High	Low	Medium	High
Global building material demand	High	Low	Medium	High

[5] HIC = High income countries, LIC = Low income countries, LMIC = Low and middle income countries

FAQ:

How are SDGs covered in the storylines of the SDP scenarios accounted for that cannot be translated into quantitative parameters for the modelling?

Some of the SDGs that are covered by the storylines of the SDP scenarios are covered in detail in the modelling, for instance the energy or land use sector. Other aspects of the SDP storylines cannot not be translated directly into model parameters. For some of them it is however possible to use proxies which can be implemented in the models, such as for example the amount of international climate financing as one proxy for international collaboration to achieve the climate targets and the SDGs. This is also an example of how social scientific theories, in particular international relations and political economy, are integrated in the translation from qualitative SDP storylines to the quantitative model assumptions. But there remain SDGs and storyline aspects that are not well reflected in the current generation of models, for example education or gender (in)equality.

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More information about SHAPE's *Sustainable Development Pathways*:
https://shape-project.org/

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