FEEM SUSTAINABILITY INDEX

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# REPORT 2013

# FEEM SI at a glance

The FEEM Sustainability Index (FEEM SI) is an **aggregate index** that aims to assess **worldwide progress in wellbeing**. It is comprised of 23 indicators related to economic, social and environmental dimensions. It provides projections of sustainability performances at the national and supranational scale up to the year 2030.

Unlike other composite indices, **FEEM SI is forward looking**. FEEM SI enables **scenario analysis** based upon different assumptions of economic, social and environmental drivers, providing **ex-ante** insights on the effects that different **policies** could have on sustainability. Its versatility allows highlighting hidden **trade-offs** or **synergies** between drivers. FEEM SI's complex framework consists of four main methodological steps, described in the boxes below.

A

## Selection of indicators

**FEEM SI is composed of sustainability indicators chosen from among the most updated indicator lists with global coverage.**

The current indicator set derives from the most relevant literature on sustainable development, green growth and inclusive growth developed by United Nations, OECD and World Bank. Indicators are grouped according to different sustainability pillars and topics, as represented in the FEEM SI indicators' structure aside.

B

## Modelling Framework

**FEEM SI is a model-based index: future trends of each indicator are simulated through an *ad-hoc* macroeconomic model extended with social and environmental variables.**

The approach used to compute future trends on economic, social and environmental variables to 2030 is based on a recursive-dynamic computable general equilibrium model (ICES-SI). This macroeconomic framework allows keeping tracks of interactions occurring within the economic system due to future economic development - mainly through input-output linkages, dynamics behaviour and international trade - as well as connections and feedbacks to social and environmental variables and indicators.

C

## Normalisation

**The indicators are normalised before comparison and aggregation.**

Because indicators of sustainable development are in different units, to attain their full comparability, they are brought to a common scale following a policy-oriented benchmarking procedure, according to a step-wise linearised function ranging between 0 and 1.

D

## Aggregation

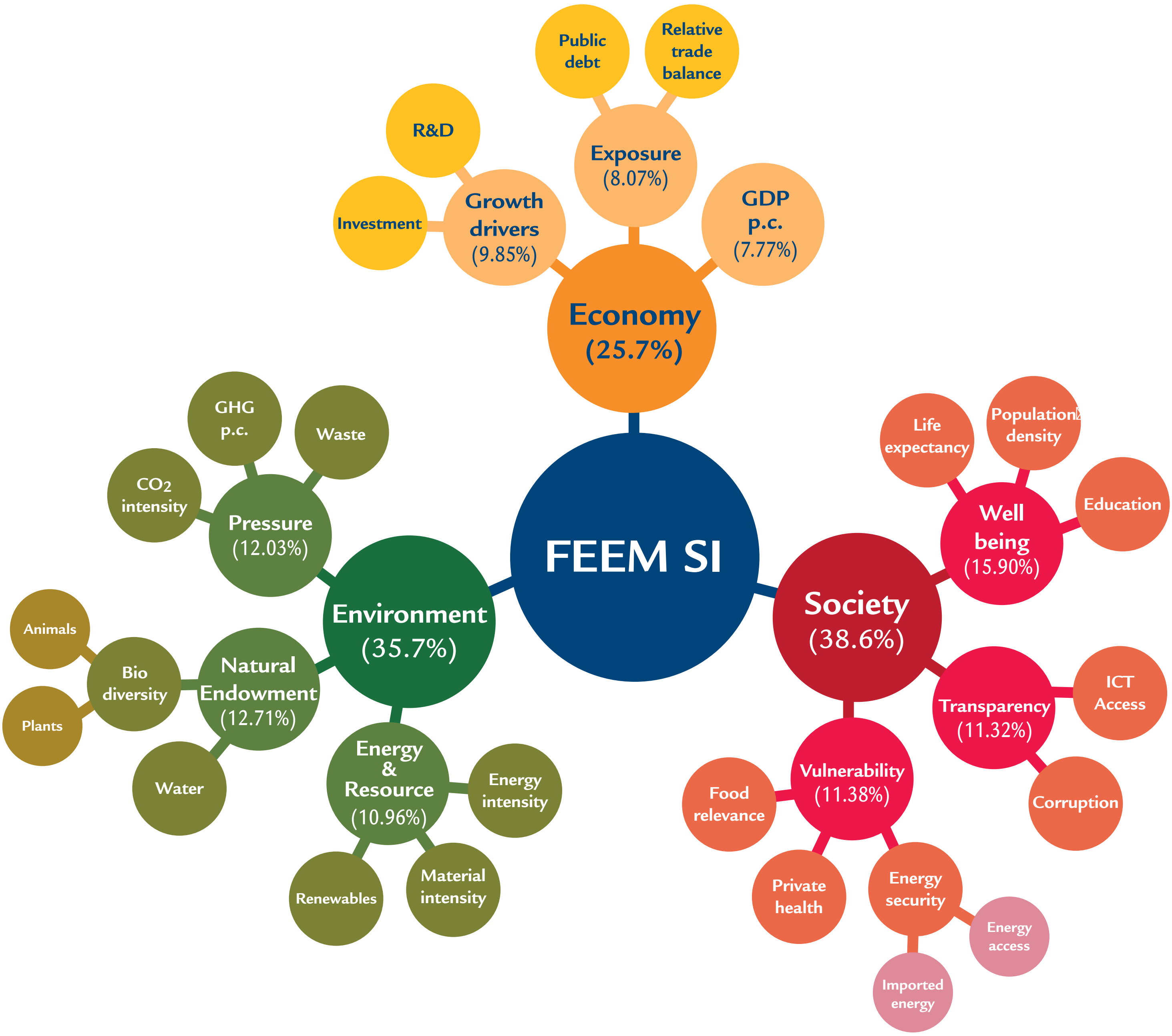
**To derive an overall measure of sustainability, the indicators within the aggregated index are weighted based on experts' judgement.**

The aggregation procedure requires two steps. First, the experts' elicitation by an on-line questionnaire to derive subjective judgements on the relative importance of each indicator and their possible interactions; second, a methodology - based on the "Choquet Integral" – to aggregate the experts' evaluations to derive a composite sustainability measure, tracking its change over time and worldwide.

# FEEM SI structure

FEEM SI covers the main three **traditional pillars of sustainable development** theory: economy, society and environment. For each of these dimensions, the FEEM SI structure incorporates a number of indicators organised within relevant topics.

The composition of the index is continuously updated according to the evolution of the debate on sustainable development and green growth. FEEM SI 2013 adds 4 indicators - "Corruption", "Information, Communication and Technology Access", "Waste Generation", and "Material Intensity" - to the set available in previous versions of the Index, bringing the total to 23 indicators.

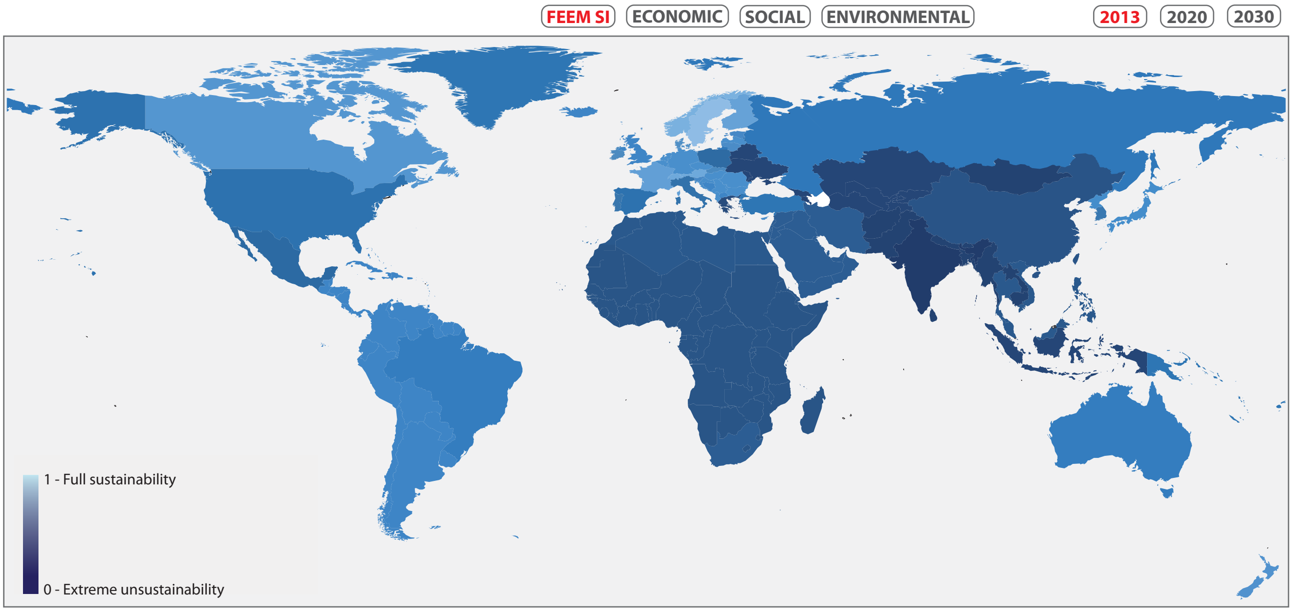



* Numbers in brackets report the different weights assigned to each pillar and main topics according to experts' evaluation.

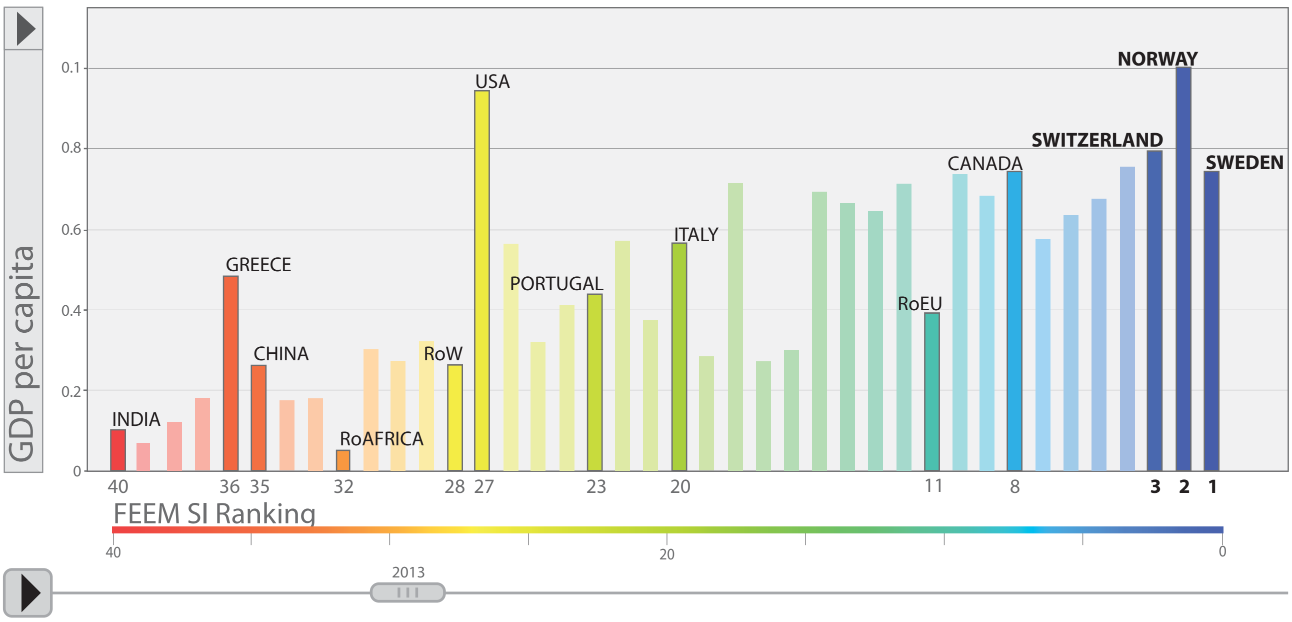
# Sustainability in 2013

The FEEM SI map below displays the degree of overall sustainability across the world in 2013. Advanced Economies show a generally higher level of sustainability, even though economic growth can negatively affect other pillars of sustainability, in particular environment.

**World maps** are available at feemsi.org for 2013, 2020 and 2030 for aggregate as well as for single dimensions of sustainability.




A more detailed picture of sustainability can be derived by looking at the relative position of a country within **international ranking**. The graph below shows a generally positive correlation between GDP per capita and sustainability ranking.




In 2013 North and Middle European countries lead the ranking, while the USA performs poorly because its economic structure is especially carbon-intensive. Recent economic trends have affected sustainability: for instance, in spite of a lower GDP per capita, China is more sustainable than Greece. India is at the very bottom of the ranking.[1]

[1] The available geographical detail is for 40 countries/macro-regions. Developed countries are considered separately, while smaller and poor countries are organized as bundles (named as: “Rest of Africa”, “Rest of the World”, etc) and grouped according to geographic criteria. This explains why, for instance, India shows the lowest score but is not necessarily the least sustainable nation in the world.

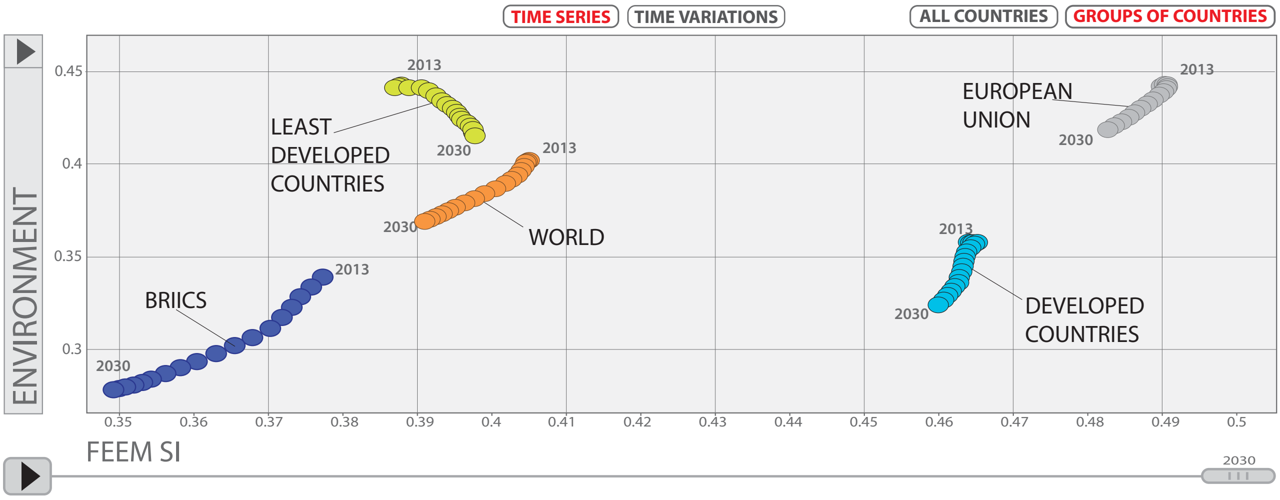
# Sustainability in 2030

**The ability to project sustainability indicators over time is an exclusive feature of FEEM SI**. This makes FEEM SI much more than a simple assessment tool, extending it as a real policy simulation environment. The table below presents the expected sustainability trend and changes in ranking from 2013 to 2030 in the Reference Scenario[2]. Overall, no dramatic variations occur over the next two decades in both FEEM SI ranking and values. The most notable differences concern Rest of the World and Rest of Africa (moving up in the ranking) and Turkey and South Africa (moving down), but with negligible changes in the FEEM SI value.

| Rank 2030 | Country/Region | FEEM SI Value 2030 | FEEM SI trend 2013-2030 | Δ rank 2013-2030 | Rank 2030 | Country/Region | FEEM SI Value 2030 | FEEM SI trend 2013-2030 | Δ rank 2013-2030 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Sweden | 0.66 | ↑ | = | 21 | South Korea | 0.42 | ↓ | +1 |
| 2 | Switzerland | 0.58 | = | +1 | 22 | Portugal | 0.41 | ↓ | +1 |
| 3 | Norway | 0.57 | ↓ | -1 | 23 | Rest of the World | 0.41 | ↑ | +5 |
| 4 | Austria | 0.57 | ↑ | = | 24 | Russia | 0.40 | ↓ | -3 |
| 5 | Finland | 0.55 | ↑ | = | 25 | Poland | 0.39 | ↓ | -1 |
| 6 | Canada | 0.53 | ↑ | +2 | 26 | USA | 0.39 | ↓ | +1 |
| 7 | France | 0.52 | ↓ | -1 | 27 | Spain | 0.36 | ↓ | -1 |
| 8 | New Zealand | 0.51 | = | -1 | 28 | Rest of Africa | 0.35 | ↑ | +4 |
| 9 | Denmark | 0.49 | ↓ | = | 29 | Turkey | 0.35 | ↓ | -4 |
| 10 | Benelux | 0.49 | ↑ | = | 30 | Mexico | 0.35 | ↓ | -1 |
| 11 | Ireland | 0.48 | ↑ | +1 | 31 | East Asia | 0.35 | ↑ | +2 |
| 12 | Rest of EU | 0.46 | ↓ | -1 | 32 | North Africa | 0.34 | = | +2 |
| 13 | Japan | 0.46 | ↓ | = | 33 | Middle East | 0.33 | ↓ | -2 |
| 14 | Germany | 0.46 | = | +1 | 34 | Greece | 0.32 | ↑ | +2 |
| 15 | RoAmerica | 0.45 | ↓ | +2 | 35 | China | 0.31 | ↓ | = |
| 16 | Australia | 0.45 | ↓ | +2 | 36 | Indonesia | 0.31 | ↑ | +2 |
| 17 | UK | 0.44 | ↓ | -3 | 37 | South Africa | 0.31 | ↓ | -7 |
| 18 | Rest of Europe | 0.43 | ↓ | -2 | 38 | Rest of Asia | 0.31 | ↑ | +1 |
| 19 | Brazil | 0.42 | ↓ | = | 39 | Rest of FSU | 0.29 | ↓ | -2 |
| 20 | Italy | 0.42 | ↓ | = | 40 | India | 0.28 | = | = |

# Sustainability trend 2013-2030

The graph below shows the trend 2013-2030 for relevant economic groups of countries: European Union, Developed Countries, BRIICS (Brasil - Russia - India - Indonesia - China - South Africa), Least Developed Countries. Environmental deterioration connected to economic growth in the reference scenario will have a reverse effect on sustainability in each Macro-Region, **offsetting potential improvement driven by economic and social development**.




The same information is available for all countries at feemsi.org and importantly, by playing with the X and Y axes, the web user can interrogate different dimensions of sustainability to analyse their interactions and relationships.

[2] The Reference Scenario reproduces one of the Socio-economic Shared Pathways (precisely, SSP2), recently provided by the climate change community to analyse challenges of future society in terms of both climate change mitigation and adaptation. SSP2 represents an intermediate scenario driven by specific assumptions on: population trends, GDP growth, technology development.

# Policy scenarios

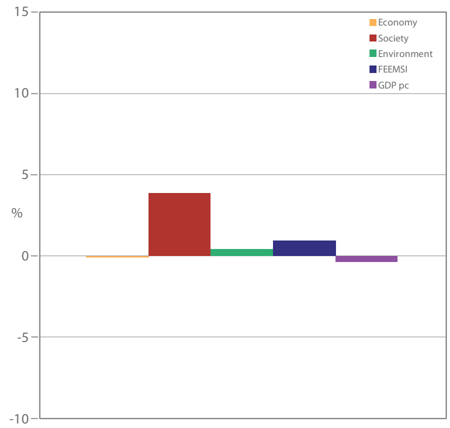
**FEEM SI adds value as a useful tool for analysis of future states of the world**: it enables comparison of sustainability performance driven by policy commitments. **Three different policy scenarios**, consistent with the achievement of a subset of Sustainable Development Goals (SDG)[3] have been analysed.
The following graphs present the effects of each policy on all sustainability dimensions, FEEM SI and GDP per capita in 2030 for the world and other aggregates. It is worth noting that the larger the distance-to-target from the policy goals listed below, the higher the benefit from policy.

## Worldwide

### *Social Policy*

- Subsidies on **Education** and **Public Health** in Least Developed Countries and BRIICS

*According to UN Sustainable Development Solutions Network Sustainable Development Goals (UN SDSN SDG n. 3 and 5), the Least Developed Countries should increase their expenditure in education and public health at least up to 5% and 3% of GDP, respectively, to increase their own social sustainability.*



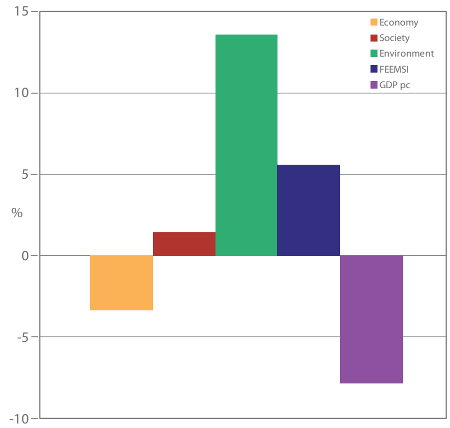

### *Environmental Policy*

- **Climate Mitigation** Policy in both Developed Countries and BRIICS

*Even though no agreed target on mitigation of climate change emissions is universally recognised or under discussion at 2030, we simulate a 40% reduction of Carbon Dioxide with respect to 1990 levels through a fully flexible international carbon market*[4]*.*

- Increase by 20% **Water use efficiency** in agriculture and industrial sectors in all Countries

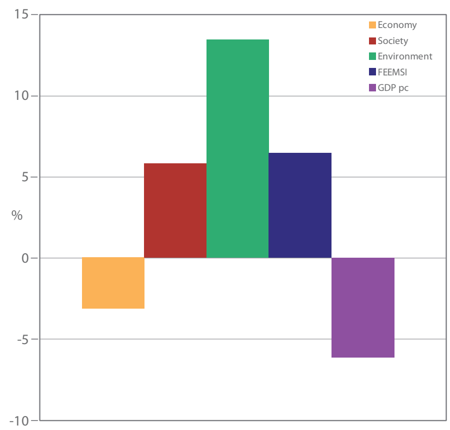
*A general increase in water efficiency, mainly but not exclusively in agriculture, is proposed worldwide to cope with the increasing water scarcity.*




### *Sustainable Development Policy*

- **Social** Policy
- **Environmental** Policy
- **Subsidies on R&D** in Developed Countries and technological transfer in agriculture and industrial sectors in Least Developed Countries

*This scenario proposes a joint implementation of both social and environmental policy, as well as an increase of R&D towards 3% of GDP as a minimum target for Developed Countries and a consistent benefit through technology transfer to Least Developed Countries and BRIICS.*




Both social and environmental policies show possible trade-offs because they increase their own dimensions and affect negatively with their own cost the economic pillar and GDP. Nevertheless, overall impact on sustainability is positive: greater in case of environmental policy that implies larger economic costs. Comprehensive sustainable development policy covering all dimensions implies a further increase in sustainability, showing a higher potential to get closer to the SDG strategy.

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[3] United Nations Sustainable Development Solutions Network (UN SDSN) released in June 2013 "An Action Agenda for Sustainable Development" proposing a list of Sustainable Development Goals at 2030, which should replace the UN Millennium Development Goals.

[4] The 40% reduction target to 2030 with respect to 1990 is calculated as an intermediate target between the two proposed by the European Union for 2020 (-20%) and 2050 (-80%), respectively; the latter is also recognised as the minimum target by UN SDSN SDG n. 8.

# Macro-Regions

Moving from the world scale to smaller aggregates, heterogeneous effects emerge from each policy on sustainability dimensions. There are two drivers explaining those differences.

On the one hand, the **direct effect** given by the policy target that has an impact only in those countries where the policy is actually implemented.

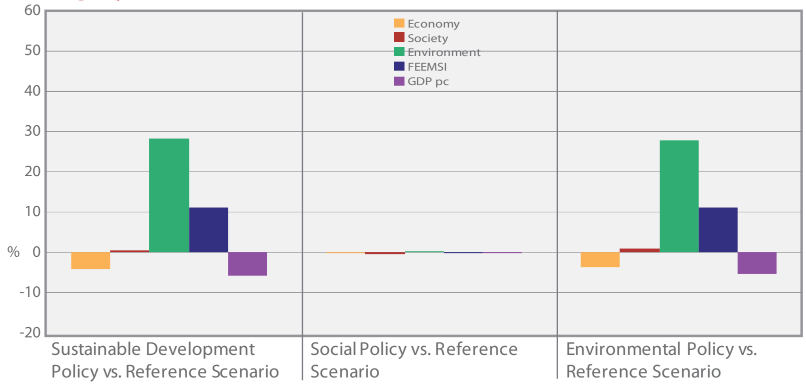
On the other hand, the **indirect effect** plays a role according to the macroeconomic behaviour that can lead to changes in both economic and related social and environmental variables. These are a consequence of the policy itself and partially increase or offset the direct effect accordingly.

Overall, **social policy** positively affects Least Developed Countries and BRIICS, increasing effort on Education and Health.

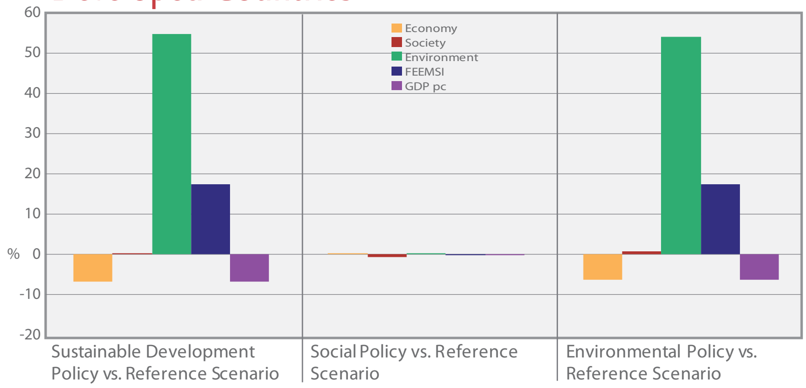
Conversely, **environmental policy** shows a huge increase in both environmental pillar and overall sustainability in Developed Countries and BRIICS and a decrease in GDP. BRIICS suffer the highest economic burden as they have lower marginal abatement costs.

The **sustainable development policy** affects both BRIICS and Least Developed Countries positively as they receive benefits from technological transfer from Developed Countries without suffering related costs.

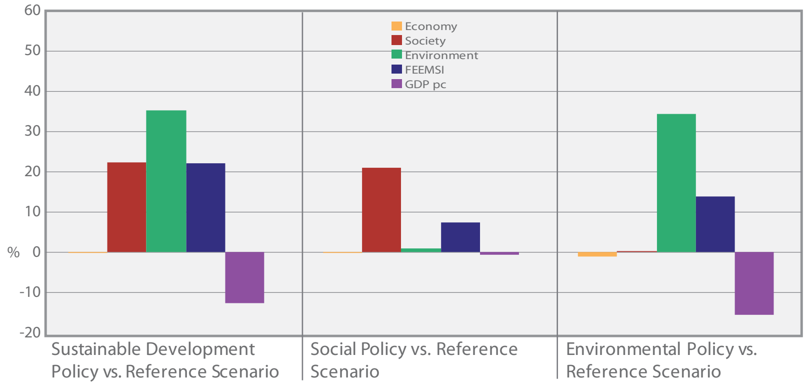
## EU27



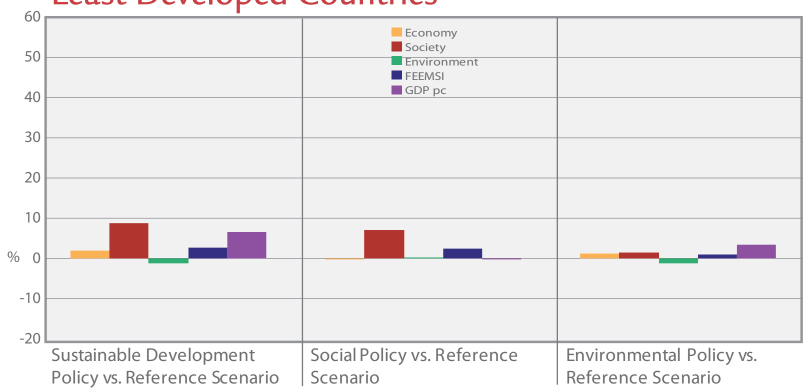

## Developed Countries




## BRIICS




## Least Developed Countries



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