Agenda

1. Energy efficiency scoreboards : comparison of methodologies
2. Round table 1: Views on methodological issues
3. Q&As
4. Quizz : Energy efficiency: What is the 2021 country winner?
5. Energy efficiency scoreboards: Detailed results and policies implemented by the winner
6. Round Table 2: How to communicate with a scoreboard?
7. Q&As
8. Conclusions: which improvements for the next ODYSSEE-MURE scoreboard?

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The ACEEE and ODYSSEE- MURE energy efficiency scoreboards.

Comparison of methodologies

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ACEEE
American Council for an Energy-Efficient Economy

ODYSSEE-MURE

EEE 2022, Saclay, September 29th 2022

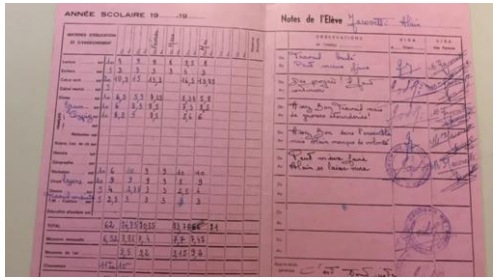
WHY SETTING-UP AN ENERGY EFFICIENCY SCOREBOARD

Scool bulletin

Universities (Shangaï)

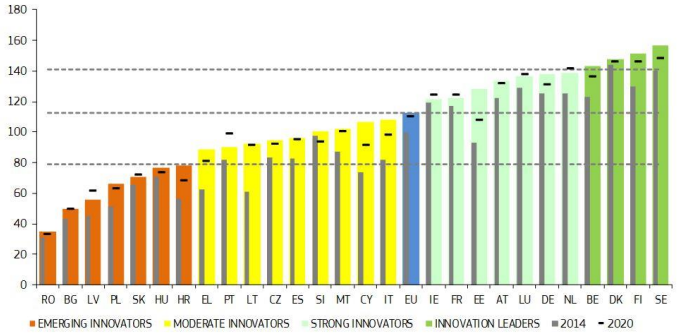
European scoreboard for innovation

Sport



Academic Ranking of World Universities 1000 Institutions

World Rank	Institution	Country/Region	National/Regional Rank	Total Score
1	Harvard University		1	100.0
2	Stanford University		2	75.9
3	University of Cambridge		1	70.6
4	Massachusetts Institute of Technology (MIT)		3	69.5
13	Paris-Saclay University		1	49.4



Saison 2021–22

Live

	Verein	Sp	S	U	N	T	GT	TD	Pkte
1	PSG	21	15	5	1	42	18	24	50
2	OGC Nizza	21	12	4	5	34	18	16	39
3	Marseille	20	10	7	3	28	16	12	37
4	RC Stras… 2-0	21	10	5	6	41	25	16	35

Type of Scoreboards	Ranking Principle
ACEEE International Energy Efficiency Scorecard	strong
ODYSSEE-MURE Energy Efficiency Scoreboard	strong
ARAB Future Energy Efficiency Index AFEX (http://www.rcreee.org/projects/arab-future-energy-index™-afex)	strong
CO2 Scorecard (http://www.co2scorecard.org/)	medium
Energy Efficiency Watch http://www.energy-efficiency-watch.org/	medium
IEA Scoreboard 2011 (https://www.iea.org/publications/freepublications/publication/IEA_Scoreboard2011.pdf)	weak
IEA country scorecards specifically related to combined heat and power https://www.iea.org/chp/countryscorecards/	weak/medium[1]

WHY THESE ENERGY EFFICIENCY SCOREBOARDS?

- **Raise the profile** of energy efficiency
- **Increase transparency** about progress and impacts of energy efficiency policy
- **Facilitate learning** – highlight successes and areas for improvement.

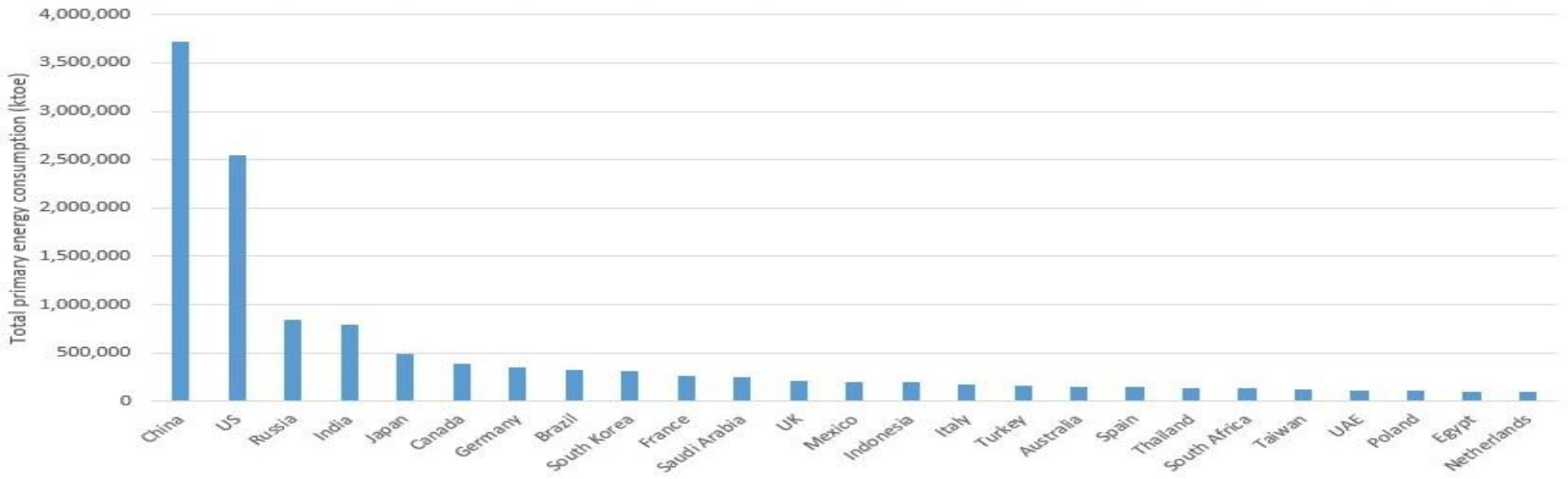
The unique aspects of this scoreboard are:

- It uses **indicators** that are adjusted for structural and climatic factors
- It accounts for **quantitative effects** of policies
- It considers impacts from the **past**, the **present**, and even **future** implications
- It weighs **various evidence-based parameters** into **one single score**

By weighing various parameters, and by looking back and to the future, the score gives a more fair and realistic description of development than simple comparisons of energy intensity.

Overall Methodology : Country coverage

23 top energy consuming countries, 35 Metrics (60%Policy, 40% performances)
Data collection from centralized sources (IEA, World Bank, WEC OECD ICCT)WEC, OECD, ICCT, et



27 EU countries+ UK+ Norway+ Serbia (200 metrics, 2500 policies)
Data collection from ODYSSEE-MURE data bases collected mainly from official sources (Eurostat etc.)

Overall Methodology : The ACEEE scoreboard

36 metrics; countries received points in the following policy categories, based on a 100-point scale

	National Efforts (25 points)
	Buildings (25 points)
	Industry (25 points)
	Transportation (25 points)

Methodology
ACEEE : Metrics to assess national efforts

Metric	Type	2022 points
Change in energy intensity between 2013 and 2018	Performance	6
Spending on energy efficiency	Policy	5
Energy savings and climate goals	Policy	3
Efficiency of thermal power plants	Performance	3
Tax credits and loan programs	Policy	2
Spending on energy efficiency RD&D	Policy	2
Size of the energy service company (ESCO) market	Performance	2
Water efficiency policy	Policy	1
Data availability	Policy	1

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ACEEE: Metrics for Transportation ACEEE

Includes the highest number of performance-oriented metrics than any other chapter in the Scorecard

Metric	Type	2022 points
Transportation		
Fuel economy standards for light-duty vehicles	Policy	4
Fuel economy of light-duty vehicles	Performance	3
Electric vehicles sales share	Performance	3
Vehicle miles traveled per capita	Performance	3
Fuel economy standards for heavy-duty tractor trucks	Policy	3
Freight transport per unit of economic activity	Performance	2
Smart freight initiatives	Policy	1
Investment in rail transit versus roads	Policy	3
Use of public transit	Performance	3

Passenger transport efficiency

Freight/heavy-duty efficiency

Investment in low-carbon modes of transit

ACEEE: Metrics for building

Metric	Type	2022 points
Buildings		
Appliance and equipment standards	Policy	5
Residential building codes	Policy	3
Commercial building codes	Policy	3
Building retrofit policies	Performance	4
Building rating and disclosure	Policy	2
Appliance and equipment labeling	Policy	2
Energy intensity in residential buildings	Performance	3
Energy intensity in commercial buildings	Performance	3

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ACEEE: comments on metrics for buildings

- Metrics are based on best-practice policies that have largest potential for energy and GHG savings in buildings
- Scores for codes (res/comm) are based on presence of national mandatory energy codes and the technical areas they cover
  - We do not score codes on implementation or compliance but we recognize that these are critical to advancing energy savings
- Energy intensity of residential bldgs: adjusted for climate
  - Weighted energy intensity based on typical heating degree days and cooling degree days and % of overall energy use that space heating or cooling account for in each country
- Energy intensity of commercial bldgs: adjusted by service-sector GDP

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ACEEE – Metrics for Industry

Metric	Type	2022 points
Energy intensity of industrial sector	Performance	6
Voluntary energy performance agreements with manufacturers	Policy	4
Policy to encourage energy management	Policy	3
Minimum efficiency standards for electric motors	Policy	2
Mandate for plant energy managers	Policy	2
Mandatory energy audits	Policy	2
Investment in manufacturing RD&D	Policy	2
Share of CHP in total installed capacity	Performance	1
Investment in manufacturing RD&D	Policy	2
Agriculture energy intensity	Performance	2

ACEEE: Comments on metrics for industry

- Energy intensity of the industrial sector = energy consumed (kBtus)/$ industrial GDP
  - Adjusted for differences in industry mix using a weighting factor that normalizes to the same mix of industry subsectors
  - Significant data limitations with country-specific energy intensity of industrial subsectors
- ACEEE scores on a mix of voluntary and regulatory policies
  - National gov't. EE program for voluntary agreements with manufacturing sector businesses
  - Law/regulation for large industrial facilities to employ energy manger
  - Mandatory energy audits for businesses

ACEEE : Data Limitations

- **Non-EE impacts on energy use**
  - Physical factors e.g., climate
  - Economic conditions
  - Demographics
  - We adjust for some of these
- **Accessible and available data**
  - Not all countries track EE data
  - Lack of consistency in approaches
- **Multiple approaches to evaluating EE progress**
- **Subnational policies and impact**

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ACEEE : Potential Improvements

- Methodology should ideally evaluate implementation of policies as many countries lack meaningful enforcement processes

- Metrics should be adjusted for physical or economic factors to the extent possible
  - E.g., Geographic size, climate, elevation, availability of natural resources
  - E.g., Demographic composition, population density, and income levels

- Incorporate metrics that consider the GHG emissions reduction potential of policies as well as equitable outcomes
  - E.g., Building retrofit programs for low-income housing or equitable transportation electrification policies
  - Long lasting impacts
  - Easiness of implementation
  - Equity of policy impact

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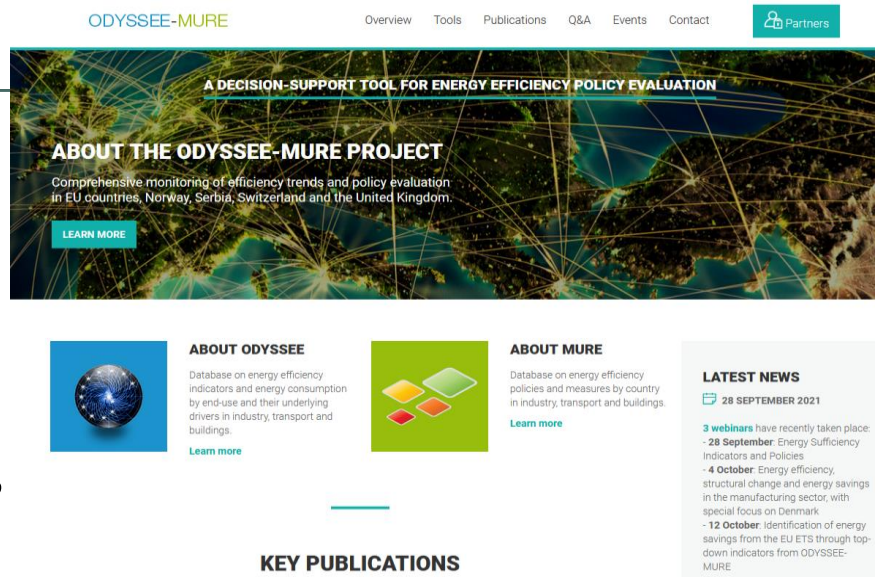
BACKGROUND: THE ODYSSEE-MURE PROJECT ON ENERGY EFFICIENCY (EE)



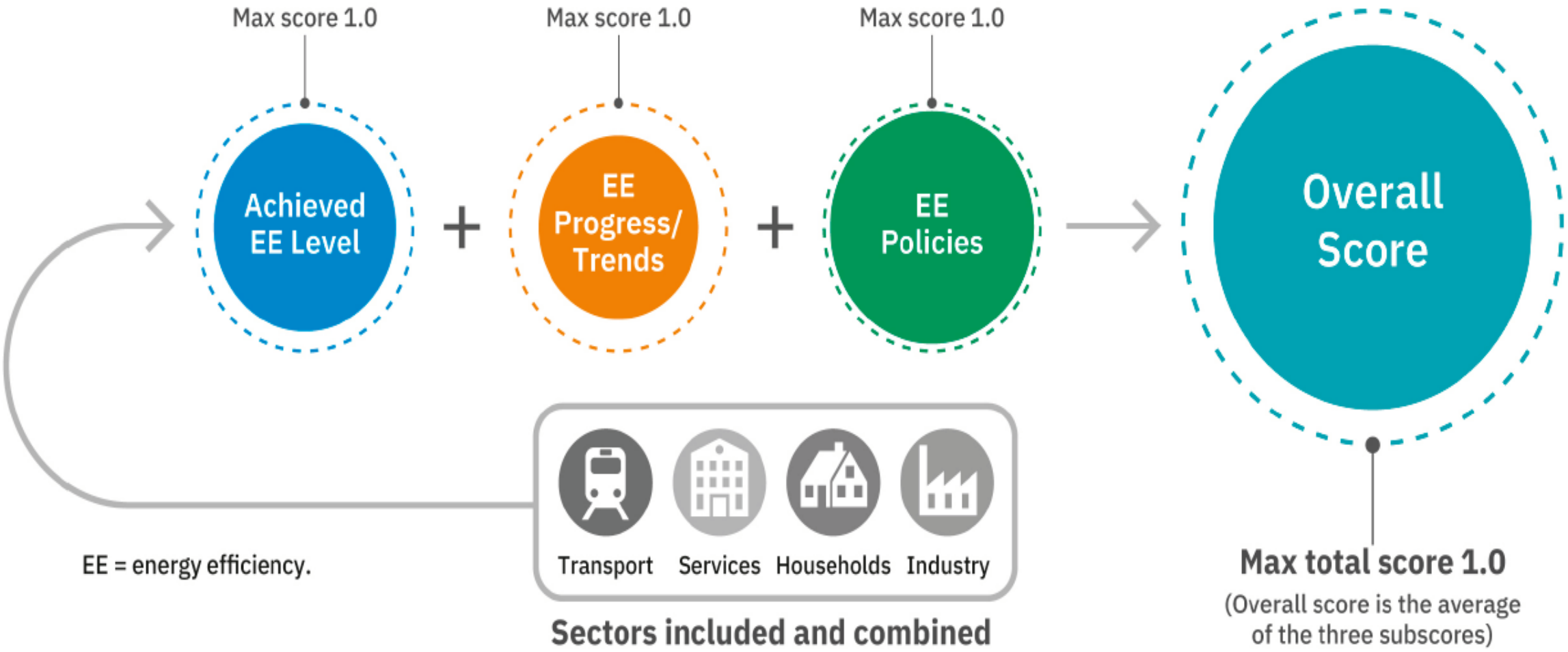
- 27 EU Member States (+UK, Norway, Switzerland, Serbia) mainly represented by energy efficiency agencies
- Heart of the project: 2 complementary databases:
  ODYSSEE on EE Indicators (200 EE indicators)
  MURE on EE Policies (2500 national EE policies)
- Decentralised data collection → legitimacy of the results
- Regular exchange on methods among 60-80 EE experts
- Harmonised data collection allowing data going « beyond the energy balance », rapid updating (- one year), quality check, benchmark through adjustments for national circonstancies
- Dissemination: sectoral and country profiles, national reports, policy briefs, webinars
- Communication tools:
  2 facilities for end-users, common website: http://www.odyssee-mure.eu/).
- Project ongoing since almost 30 years; next round starting in autumn 2022

WHAT IS THE ODYSSEE-MURE ENERGY EFFICIENCY SCOREBOARD?

- Benchmarking tool to compare the impacts of energy efficiency policies and developments amongst European countries.
- Intended to paint a well-rounded picture of how a country is performing with respect to energy efficiency, relative to its peers in Europe.
- First energy efficiency scoreboard to account for quantitative impacts of policies (output-based scoring).
- It accounts for several decades of statistical data as well as future impacts of current energy efficiency programmes.

- Cooperation with the European Council for an Energy Efficient Economy eceee

ODYSSEE-MURE : OVERAL METHODOLOGY



THE SCORE “LEVEL” – ASSESSING TODAY’S PERFORMANCE LEVEL

The Level Score answers the question “How is my country **currently** performing with respect to energy efficiency?”

Quantitative measure of a country’s performance at the present time, influenced by autonomous developments, energy prices and policies in place. Accounts for all major sectors of the economy (Industry, Transport, Households, and Services).

The scoring is based on **adjusted** and mainly **physical indicators** for energy efficiency (and not on simple energy intensities), such as:

- energy use per m2 and building type (household, office…)
- share of public transportation in total land passenger transport
- specific energy consumption for industrial branches

Note: The “Level” parameter is based on top-down statistical EE indicators in the ODYSSEE database

THE SCORE “TREND” – A LOOK AT PROGRESS SINCE 2010

The Trend score answers the question “How much **progress** has the country achieved in the area of energy efficiency?”

The Trend score determines progress using the same set of energy efficiency indicators as selected for the “Level” score since the year 2010.

Dynamic parameter that takes development and past actions i nto account.

Note: The “Trend” parameter is based on top-down statistical EE indicators in the ODYSSEE database

SCORING OF LEVELS AND TRENDS (BASED ON ODYSSEE-INDICATORS) (1/4)

The scoring methodology is based on the OECD Composite Indicator methodology. This method allows the countries to be compared in a relevant range where minimum and maximum values indicators define the best and worst scores and countries are ranked between these two extrema. The indicators are calculated and normalized so that they range between 0 and 1 following this formula:

$$Normalized\ score = \frac{Indicator - Min\ indicator}{(Max\ indicator - Min\ indicator) * direction} + 0.5 * (1 - direction)$$

Indicator: The indicator value of the country.
Min indicator: The minimum indicator value across all countries.
Max indicator: The maximum indicator value across all countries.
Direction: The favored direction in the level of indicator; -1 if the decline is favored, 1 if the incline is favored

SCORING OF LEVELS AND TRENDS (BASED ON ODYSSEE-INDICATORS) (2/4)

Example of calculation of score for cars : case of Austria

Unit consumption of cars (goe/pkm)

aut	0.050
bel	0.040
cyp	0.064
esp	0.044
fin	0.030
fra	0.033
gbr	0.036
grc	0.025
hun	0.038
irl	0.039
ita	0.024
lat	0.043
lth	0.040
lux	0.040
mlt	0.042
nld	0.042
rom	0.022

Max indicator : 0.064

Min indicator : 0.022

Direction = -1 (decline in the indicator is favored)

Austria = 0.05

Normalized score calculation for Austria :

$$\frac{0.05 - 0.022}{(0.064 - 0.022)*(-1)} + 0.5 * (1-(-1)) = 0.33$$

SCORING OF LEVELS AND TRENDS (BASED ON ODYSSEE-INDICATORS) 3/4

The scoring of sectors is done as follows:

- Scoring is done separately for four sectors (households, transport, industry and services) and for all sectors together.
- The score by sector is based on scores calculated for selected indicators representative of end-uses in buildings or modes in transport. For industry the score is directly based on an aggregate indicator that already accounts for the energy efficiency characteristics of the various industrial branches.
- The score by sector is calculated as a weighted score of each indicator. The weights correspond to the average shares over the last 3 years of each end-use or transport mode in the sector consumption
- The sectoral score is normalised to a range of 0 (corresponding to the lowest country value for a sector) to 1 (corresponding to the highest country value for a sector). The scale is set by the EU countries: highest value from a EU country = 1, lowest value from an EU country = 0. Non-EU countries which exceed 1 or show values below zero are set to 1 or 0 respectively

- The score based on the level of the indicator is calculated as a moving average of the last three years to smoothen yearly variations (i.e. 2015-2017 for the 2019 scoreboard).
- The second score is based on the trend indicator since 2000 (variation 2000-2017 for the 2019 scoreboard)

SCORING OF LEVELS AND TRENDS (BASED ON ODYSSEE-INDICATORS) 4/4

Example of calculation of score for a sector: case of transport Austria

The score of the sector (transport) is calculated by weighing the indicator scores.

Transport **level score** for Austria: $0.33 * 58\% + 0.96 * 25\% + 0.95 * 12\% + 0.70 * 3\% + 0.57 * 2\% = \mathbf{0.58}$

The score is normalized from 0 to 1 so as to give 1 to the highest value, 0 to the lowest: if the highest value for the sector is 0.91 and the lowest 0.30, the **normalized level score of** transport for Austria is:

$$\frac{(0.58-0.30)}{(0.91-0.30)} = \mathbf{0.46}$$

The same is done for the calculation of the trend score.

Austria (fictive example)	Cars	Trucks and light vehicles	Air	Public transport passengers	Rail and fluvial goods
Level scores normalized	0.33	0.96	0.95	0.70	0.57
Weigths (share of each mode in transport consumption)	58%	25%	12%	3%	2%

SERVICES: LIST OF INDICATORS

End-use	Indicator	Weighting factor
Thermal end-uses	Thermal end-uses consumption per employee scaled to EU climate	Share of thermal end-uses in total services
Electricity	Specific consumption of electricity per employee (including AC and excluding thermal uses[4])	Share of specific electricity consumption in total services

HOUSEHOLDS: LIST OF INDICATORS

End-use	Indicator	Weighting factor
Heating	Consumption for heating per m^2 scaled to EU climate and equivalent to central heating[3]	Share of heating in total households consumption
Other thermal uses	Consumption per dwelling for cooking and water heating	Share of cooking + ½ of water heating in total households consumption
Appliances	Specific consumption of electricity per dwelling for appliances (including AC) and lighting	Share of appliances (incl. AC) & lighting in households consumption
Solar penetration	% of dwellings with solar water heater	½ share of water heating in households consumption

TRANSPORT: LIST OF INDICATORS

Modes	Indicator	Weighting factor
Cars	Specific consumption (goe/pkm)	Share of cars in total transport consumption
Trucks and light vehicles	Specific consumption (goe/tkm)	Share of trucks and light vehicles in total transport consumption
Domestic air	Specific consumption (goe/pkm)	Share of domestic air in total transport consumption
Modal split: -Passengers	% of traffic by public mode	Share of buses and rail passengers in total transport consumption
-Goods	% of traffic by rail and water	Share of water and rail freight consumption in total transport

INDUSTRY: LIST OF INDICATORS

Category	Indicator
Indicator of trend	ODEX (energy efficiency index)[5]
Indicator of level	Adjusted energy intensity at EU industry structure[6]

5 ODEX measures the energy efficiency progress. The index is calculated as a weighted average of sub-sectoral indices of unit consumption by branch; the weight used is the share of each branch in the total energy consumption of industry. The evaluation is carried out at the level of 10 branches: the unit consumption is expressed in terms of energy used per ton produced for energy intensive products (steel, cement and paper) and in terms of energy used related to the production index for the other branches

6 The energy intensity of industry at EU structure represents a fictitious value of the industrial intensity calculated by taking for each industrial branch the actual sectoral intensity of the country and the EU industrial structure (i.e. the share of each branch in the value added of industry). For Finland and Sweden, as pulp & paper represents around half of the total industrial consumption, the adjusted indicator is based on physical quantities instead of value added for pulp & paper (production of paper and pulp) and on VA for the other branches.

THE "POLICY" SCORE – QUANTIFYING FUTURE SAVINGS FROM TODAY'S POLICIES

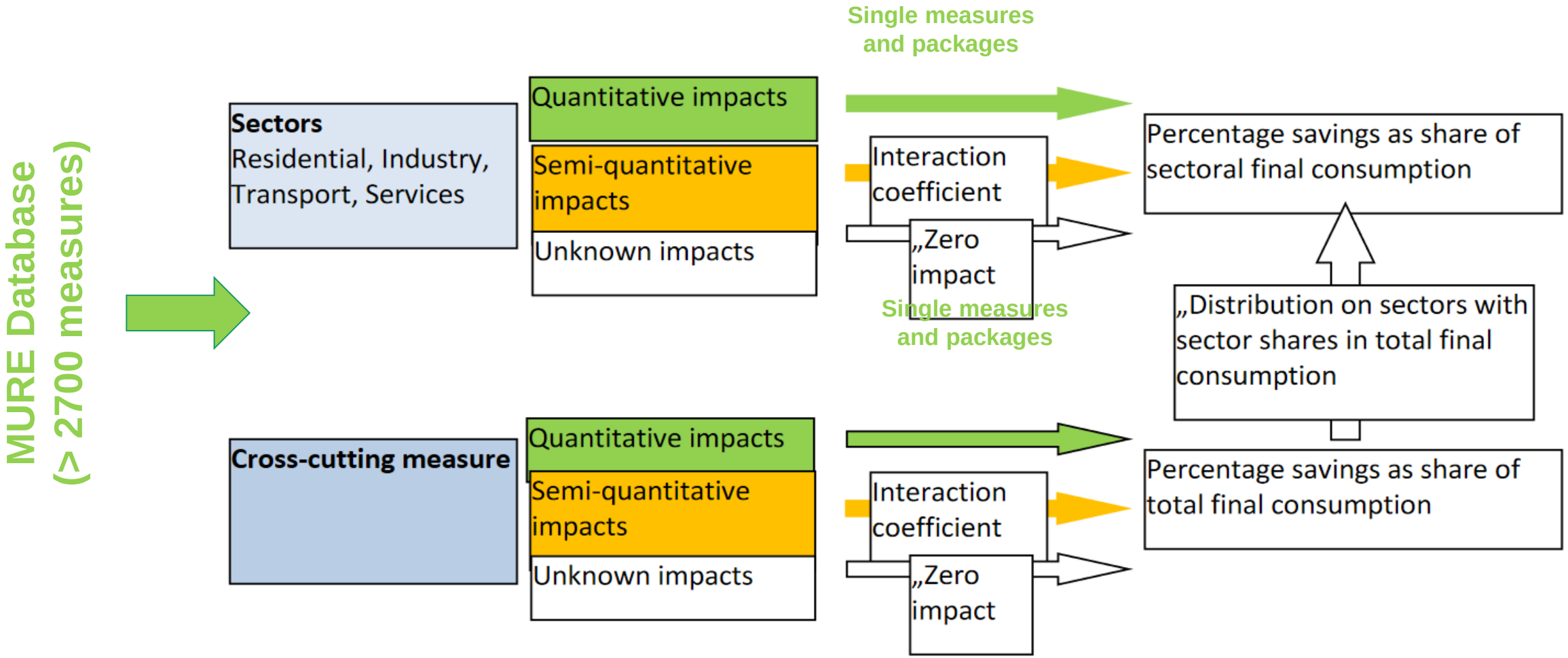
The Policy Score answers the question "What **future impacts** can I expect from **recent policies** enacted in my country?"

This score forecasts the energy-saving impacts of more recent policies from a given starting year, e.g., 2015, until a target year (e.g., until 2020/2030). It converts policy impacts into a quantitative or semi-quantitative score.

Bottom-up evaluation of policies, based on the energy savings expected to be achieved in each sector compared to the sectoral energy consumption.

Note: Policy impacts are gathered in the MURE Database from quantitative and semi-quantitative measure impact evaluations in a target year, e.g., 2030

SCORING OF POLICIES (BASED ON MURE ENERGY EFFICIENCY POLICIES) BASIC METHODOLOGY FOR THE OUTPUT-BASED SCOREBOARD



SCORING OF POLICIES (BASED ON MURE ENERGY EFFICIENCY POLICIES) THE CASE OF WHEN QUANTITAIVE INFORMATION DO EXISTS (BU)

For each country : $ES_{s,\ quantitative} = SUM\ (ES)_{s,j}$ s: sector, j: individual measure

In the example below, the quantitative savings add up to 55 PJ

Country: Germany, Sector s: Housholds		
Measure Number j	Measure Title	Quantitative Impact in 2020 (PJ)
1	Building regulation	27.0
2	Subsidy scheme	18.0
3	Information programme	3.0
4	Energy label	7.0
	ES(s, quantitative) =	**55.0**

SCORING OF POLICIES (BASED ON MURE ENERGY EFFICIENCY POLICIES) THE CASE WHEN ONLY SEMI-QUANTITATIVE INFORMATION DO EXIST

Country: Germany, Sector s: Housholds		Final energy consumption households 2016 (PJ):		2327
Measure Number j	Measure Title	Impact category	Semi-quantitative impact (% of final demand of sector	Quantitative Impact in 2020 (PJ)
1	Subsidy scheme	High	0.5%	11.6
2	Saving obligation	Medium	0.3%	7.0
3	Information programme	Low	0.1%	2.3
4	Audit scheme	Low	0.1%	2.3
			ES(s, semi-quantitative) =	**23.3**
			ES(s, semi-quantitative, including interaction factor) =	**22.4**

Interaction Factor (IF_s) =0.99^$(n-1)_s$ (for n measures in the sector s) assuming 1% lost of impact at each interaction

COMPARISON OF THE TWO SCOREBORDS

- Similarities
  - Strong ranking principle (weighting and scoring)
  - Transparent criteria traced back to energy use or policies
  - Results show room for improvement
- Differences
  - Approach to policy and performance metrics
  - Level of adjustment to normalize data for comparison
  - Measurement of impact of policies
  - Data collection and availability

ODYSSEE-MURE SCOREBOARD
SOME ISSUES FOR THE ROUND TABLE 1

Do we account for comfort and standard of living?

Do we fail to catch comfort level, such as differences in indoor temperature? Do we give poor countries too high rating?

- The scoreboard doesn't take the level of energy services into account.
- However, the "Trend" score for each a country relies on 10 years of comparable data for the country.
- We can assume that the level of services has not changed drastically.

What about weather fluctuation and differences in industry structure?

- The "Level" score uses average data for the last three years to account for changes in specific years.
- Differences among countries concerning climate and annual temperature variations are corrected for.
- Different industry structures are accounted for.

What about sufficiency?

- A country with more sqm floor space per person is compared with countries with fewer square meters per person.
- The share of public transport is compared to the total passenger transportation in a given country.
- Additional indicators in future could be added, reflecting the impact of sufficiency policies on energy efficiency on the scoreboard.

THE "POLICY" SCORE : STRENGHTS AND WEAKNESSES

Strengths

- Uses actual measure impacts (energy savings)
- Bottom-up approach (single measures + measure packages)
- Could in principle be further complemented with multiple benefits (see H2020 MICAT project)
- Full coverage of policy measures (including semi-quantitative impacts
- Triggers search for unknown measure impacts

Weaknesses

- Availability of quantified measures
- „Reliability" of quantifications (independant evaluation versus „official" evaluations in NECPs...
- Requires semi-quantitative estimates (but usually large measures are quantified)
- Control of measure interaction necessary

METHODOLOGICAL QUESTIONS FOR THE ROUND TABLE 1 (ODYSSEE-MURE PERSPECTIVE)

- **Indicators scoreboard**:
  - Choices of EE indicators (e.mobility)
  - Period of reference (trends 2010-2020, previously 2000-2020 strong progress of Eastern countries)
  - 3 years moving average average
  - Type of adjustments: structure of economy/industry, climatic corrections etc. National specificities
  - Inequalities (Fuel poverty); sufficiency (i.e; indoor temperatures); Shared economy
  - Weighting procedures (according to share of consumptions)
- **Policies Scoreboard**
  - Impact of the time period:, Policy impacts (now 2020, future 2030)
  - Reliability of quantifications (independants versus official evaluations)
  - Intercountry comparability of impacts
  - Interactions, spillover effects MBAbscence of times series
- **Overall scoreboard** : Equal weighting of Energy Efficiency Levels, Trends, Policies

This presentation and infographic on the energy efficiency scoreboard was developed by Borg & Co and eceee as part of the ODYSSEE-MURE project.

Graphic design: Björkman & Mitchell

More information

https://www.odyssee-mure.eu/data-tools/scoring-efficiency-countries.html

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