PROMITHEAS – 4

Knowledge transfer and research needs for preparing mitigation/adaptation policy portfolios

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Evaluation of Mitigation / Adaptation policy portfolios for Turkey

Authors: Nuray Guler AKALIN, Deniz SARI, Dr. Bilgin HILMIOGLU
TUBITAK-Marmara Research Center - Environment Institute

Co-authors: Dr. Popi KONIDARI, Anna FLESSA M.Sc.
National and Kapodistrian University of Athens - Energy Policy and Development Centre

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ABBREVIATIONS

Abbreviation	Full name
BAU	Business As Usual
CDM	Clean Development Mechanism
CEI	Cost Efficiency Index
CER	Certified Emission Reduction
COP	Conference of the Parties
DMI	State Meteorological Services
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EE	Energy Efficiency
EIE	General Directorate of Electrical Power Resources Survey and Development Administration
EMRA	Energy Market Regulatory Authority
ERU	Emission Reduction Unit
ESCO	Energy Service Company
ET	Emission Trading
EU	European Union
EUA	European Union Emission Allowance
EVD	Energy efficiency consultancy companies
FAO	Food and Agriculture Organization
FIT	Feed In Tariffs
GHG	Greenhouse Gas
GO	Governmental Order
IEA	International Energy Agency
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
LEAP	Long range Energy Alternatives Planning System
LULUCF	Land Use, Land Use Change and Forestry
MENR	Ministry of Energy and Natural Resources
MoEF	Ministry of Environment and Forestry (restructured in June 2011)
MoEU	Ministry of Environment and Urbanism
NGO	Non-Governmental Organization
NIR	National Inventory Report
OECD	Organisation for Economic Co-operation and Development
OPT	Optimistic
PES	Pessimistic
R&D	Research and Development
RES	Renewable Energy Sources
SEE	South East Europe
SEECOF	South East Europe Climate Outlook Forum
TEIAS	Turkish Electricity Transmission Corporation
TNO	Transmission Network Operator
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
WMO	World Meteorological Organization

ASSESSMENT OF THE THREE DEVELOPED SCENARIOS FOR TURKEY, THROUGH THE MULTI - CRITERIA METHOD AMS

General comments

Performance of the three policy mixtures (BAU, OPT and PES) are assessed by AMS method. The AMS method is the combination of three standard multi-criteria methods: the Analytical Hierarchy Process (AHP), the Multi-Attribute Utility Theory (MAUT) and the Simple Multi-Attribute Ranking Technique (SMART) (Konidari and Mavrakis, 2007; 2006). AMS evaluates the policy mixtures by three criteria named as environmental performance, political acceptability and feasibility of implementation.

A. Required data

The LEAP provides the following outcomes for all three scenarios:

Table 1: Total emissions.

Scenario	Total GHG emissions (in $MtCO_{2eq}$)		
	2000	**2020**	**2050**
BAU	157.97	390.32	1273.45
Opt	157.97	188.92	1039.44
Pes	157.97	308.24	1187.79

Table 2: Emissions per sector.

Scenario	GHG emissions (in $MtCO_{2eq}$)		
	2000	**2020**	**2050**
Households and Services			
BAU	29.20	73.04	239.39
Opt	29.20	62.24	223.18
Pes	29.20	67.64	231.28
Agriculture			
BAU	8.57	19.59	72.25
Opt	8.57	19.59	72.25
Pes	8.57	19.59	72.25
Industry			
BAU	64.37	109.30	403.16
Opt	64.37	97.31	388.59
Pes	64.37	103.30	395.88
Transport			
BAU	35.20	66.51	245.34
Opt	35.20	53.27	189.83
Pes	35.20	60.58	221.33
Electricity generation			
BAU	54.77	103.37	264.80
Opt	54.77	60.34	215.98
Pes	54.77	67.81	236.02

Table 3: Other environmental effects under each scenario.

Scenario	Million Metric Tonnes CO_2 eq		
	2000	**2020**	**2050**
Environmental effects (Carbon Monoxide (CO)- Nitrogen Oxides (NOx)- Non Methane Volatile Organic Compounds- Sulfur Dioxide(SO_2))			
BAU	87.71	16.34	55.86
Opt	87.71	12.90	45.94
Pes	87.71	14.53	51.31

Table 4: Water Use.

Scenario	Billion m^3		
	2000	**2020**	**2050**
Households - Services			
BAU	1.804	1.786	1.786
Opt	1.804	1.877	2.181
Pes	1.804	1.973	2.659
Industry			
BAU	1.454	1.312	1.312
Opt	1.454	1.338	1.421
Pes	1.454	1.379	1.601

B. Assignment of grades

The software ClimAMS-2012 is used for the evaluation of the scenarios (Figure 28).

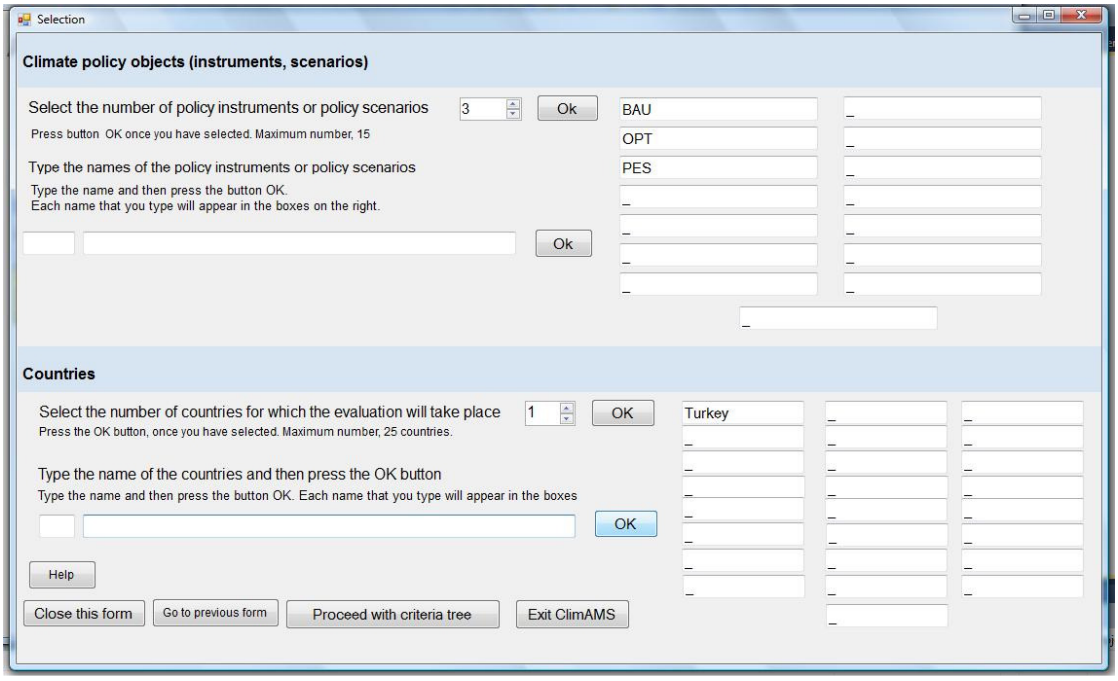

Figure 1: Initial settings for the three scenarios in ClimAMS-2012.

Criterion 1: Environmental performance

Direct contribution to GHG emission reductions: For this sub-criterion, the outcome of LEAP for the total expected GHG emissions in year 2020 are used (Table 8). The scenario with the fewer amounts of emissions has the best performance for this sub-criterion.

Indirect environmental effects: The total amount of the total environmental effects provided by LEAP (Table 10) is used to assess the sub-criterion.

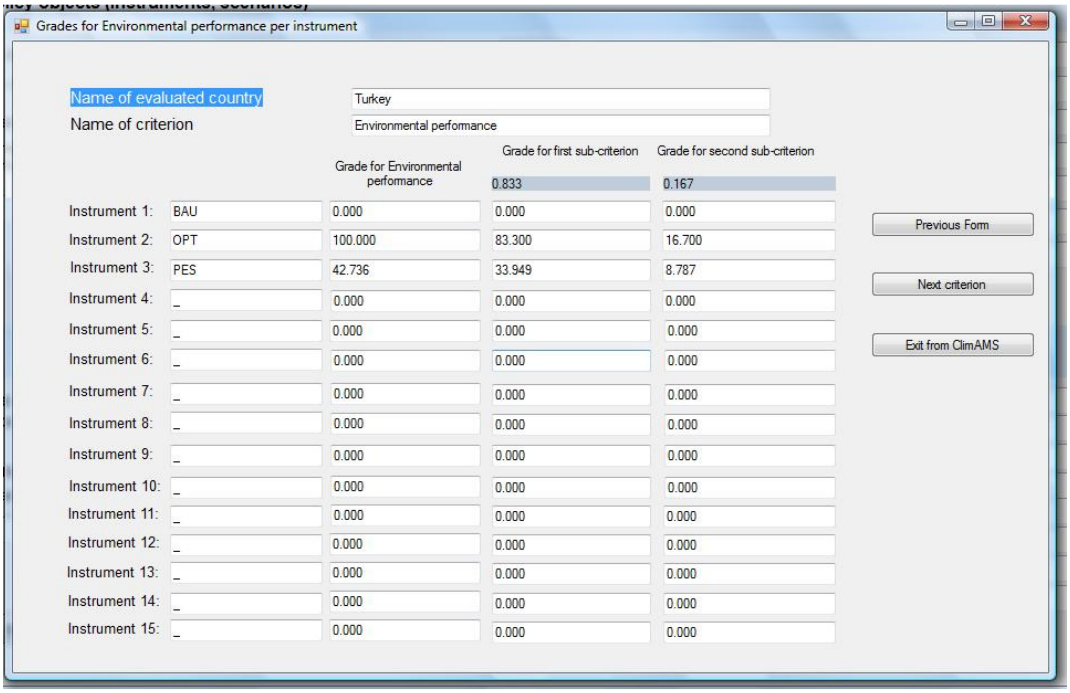

Figure 2: Grades for environmental performance and its sub-criterion.

Criterion 2: Political acceptability

Cost Effectiveness: For this sub-criterion, the mean Cost Efficiency Index (CEI) for each sector was calculated depending on the policy instruments that were selected in each scenario. Each value was multiplied with the respective amount of GHG emission reductions that were estimated by LEAP outcomes. Emission reductions were calculated using those of BAU as the reference point. This methodology was followed since the Turkish emissions will increase within the next years. Turkey is an emerging economy and has no quantitative emission reduction target. The adoption of additional policy instruments for the Opt and the Pes scenario will lead to emission reductions and these are used for the evaluation.

Calculations are presented in Tables 12, 13, 14 and 15. Costs for adaptation are zero since no reductions in water use are attributed to proposed measures for the particular sector.

Table 5: Mean CEI for each sector depending on the policy instruments of the BAU scenario.

Mitigation					
Scen.	**Sector**	**Technological options**	**Policy instrument**	**CEI**	**Mean CEI**
BAU	Buildings (Households and Services)	Energy and thermal insulation	Building isolation requirements (Law 5627/2007, Regulation 27075/2008)	-1.5	(-1.5-5.75-2.5)/3= -3.25
		Energy management	Performance standards (energy certificates, energy consumption) (Law 5627/2007, Regulation 27075/2008)	-5.75	
		Energy efficiency	Eco-design requirements (Regulation 27722/2010)	-2.5	
	Industry	Energy management	Performance standards (energy certificates, energy consumption) (Law 5627/2007, Regulation 27075/2008)	-4	-4
	Transport	Energy efficiency	Performance standards (transport management) (Regulation 26901/2008)	0.5	(0.5-0.25+0.5)/3= 0.25
		Energy efficiency of vehicles	Behavior change (Awareness, eco-driving, fuel economy) (Regulation 26901/2008)	-0.25	
		Energy management	Performance standards (principles and procedures) (Law 5627/2007)	0.5	
	Energy	Promotion of RES technologies	Regulation standards (Certification of RES, principles and procedures) (Law 5346/2005, Law 5627/2007)	-0.75	(-0.75-0.25+1.25)/3= 0.083
		Promotion of RES technologies	Subsidy (Feed-in-tariffs) (Law 5346/2005)	-0.25	
		Energy efficiency	Eco-design requirements (Regulation 27722/2010)	+1.25	

Table 6: Mean CEI for each sector depending on the selected policy instruments of the OPT scenario.

Mitigation					
Scen.	**Sector**	**Technological options**	**Policy instrument**	**CEI**	**Mean CEI**
OPT	Buildings (Households and Services)	Energy and thermal insulation	Building isolation requirements (Law 5627/2007, Regulation 27075/2008)	-1.5	(-1.5-5.75-2.5-2.5-2.5-0.75)/6 = -2.583
		Energy management	Performance standards (energy certificates, energy consumption, building code) (Law 5627/2007, Regulation 27075/2008 and Proposed)	-5.75	
		Energy efficiency	Eco-design requirements (Regulation 27722/2010)	-2.5	
			Energy efficient appliances - Proposed	-2.5	
			Energy efficient lighting - Proposed	-2.5	
			Economic instrument (Sanction) - Proposed	-0.75	
	Industry	Energy management	Performance standards (energy certificates, energy consumption) (Law 5627/2007, Regulation 27075/2008)	-4	-4
	Transport	Energy efficiency	Performance standards (transport management) (Regulation 26901/2008 and proposed)	0.5	(0.5-0.25+0.5+0.25-1.75+0.75)/6 = 0
		Energy efficiency of vehicles	Behavior change (Awareness, eco-driving, fuel economy) (Regulation 26901/2008)	-0.25	
		Energy management	Performance standards (principles and procedures) (Law 5627/2007)	0.5	
		Energy efficiency	Fuel switch (to biofuels) - Proposed	0.25	
		Energy efficiency	Energy efficient vehicles	-1.75	
		Energy efficiency	Subsidy - Proposed	0.75	
	Energy	Promotion of RES technologies	Regulation standards (Certification of RES, principles and procedures) (Law 5346/2005, Law 5627/2007)	-0.75	(-0.75-0.25+1.25-0.75)/4 = 0
		Promotion of RES technologies	Subsidy (Feed-in-tariffs) (Law 5346/2005 and Law 6094/2011)	-0.25	
		Energy efficiency	Eco-design requirements (Regulation 27722/2010)	+1.25	
		Promotion of RES and EE technologies	Tradable permits – Proposed	-0.25	
Adaptation					
	Agriculture	Irrigation systems, plantations	Subsidy - Proposed	0.5	
			Land management - Proposed	-0.83	
			Water management - Proposed	-1	
			Awareness	-1/6	

Table 7: Mean CEI for each sector depending on the selected policy instruments of the PES scenario.

Mitigation					
Scen.	**Sector**	**Technological options**	**Policy instrument**	**CEI**	**Mean CEI**
PES	Buildings (Households and Services)	Energy and thermal insulation	Building isolation requirements (Law 5627/2007, Regulation 27075/2008)	-1.5	(-1.5-5.75-2.5)/3 = -10.5/5 = -3.25
		Energy management	Performance standards (energy certificates, energy consumption, building code) (Law 5627/2007, Regulation 27075/2008 and Proposed)	-5.75	
		Energy efficiency	Eco-design requirements (Regulation 27722/2010)	-2.5	
	Industry	Energy management	Performance standards (energy certificates, energy consumption) (Law 5627/2007, Regulation 27075/2008)	-4	-4
	Transport	Energy efficiency	Performance standards (transport management) (Regulation 26901/2008)	0.5	(0.5-0.25+0.25-1.75+0.75) = -0.5
		Energy efficiency of vehicles	Behavior change (Awareness, eco-driving, fuel economy) (Regulation 26901/2008)	-0.25	
		Energy management	Performance standards (principles and procedures) (Law 5627/2007)	0.5	
		Energy efficiency	Energy efficient vehicles	-1.75	
	Energy	Promotion of RES technologies	Subsidy (Feed-in-tariffs) (Law 5346/2005 and Law 6094/2011)	-0.25	(-0.25+1.25)/2 = 0.5
		Energy efficiency	Eco-design requirements (Regulation 27722/2010)	+1.25	
Adaptation					
	Agriculture	Irrigation systems, plantations	Subsidy - Proposed	0.5	
			Land management - Proposed	-0.83	
			Water management - Proposed	-1	

Table 8: Overall cost efficiency for the three scenarios.

Scen.	Mitigation/Adaptation Cost										Total
	Buildings		Agriculture		Industry		Transport		Energy		
	M	A	M	A	M	A	M	A	M	A	
BAU	0	0	0	0	0	0	0	0	0	0	0
Opt	-27.89	0	0	0	-47.96	0	0	0	0	0	-75.86
Pes	-17.55	0	0	0	-24	0	2.97	0	17.78	0	-20.80

Dynamic cost efficiency: In OPT scenario, it is assumed that all types of RES technologies and energy efficiency technologies are promoted by feed in tariffs and subsidies. Electricity generation from hydro-power is already a mature technology for Turkey. In OPT scenario, it is assumed that wind, geothermal, biomass and solar are also promoted. No research efforts for RES technologies are promoted in any scenario. The assigned grades are: BAU – 4, Opt – 5, Pes – 4.

Competitiveness: Agriculture is one of the most important sectors of the Turkish economy (Republic of Turkey – Prime Ministry, 2010). The sector has a significant impact on the social and economic development of the country because: i) it fulfils the majority of the population's food requirements domestically (Republic of Turkey – Prime Ministry, 2010); ii) it prevents Turkey from being dependent on international sources and iii) supplies the raw materials of other sectors dependent on agriculture (Republic of Turkey – Prime Ministry, 2010). Additionally, Turkey is a major world producer and exporter in fruit and vegetables (European Commission - Agriculture and Rural development, 2010).

Due to expected climate changes such as drought or flood, agricultural production is threaten affecting its competitiveness unless measures are adopted (Republic of Turkey – Prime Ministry, 2010).

The Turkish industry needs to adapt to the increasing global competition, improve its own competitiveness and maintain its high-growth areas (Republic of Turkey – Ministry of Industry and Trade, 2010). For the achievement of these objectives an important activity is the increase of energy efficiency since it enables more production with less energy, reduces industrial costs and decreases gas emissions (Republic of Turkey – Ministry of Industry and Trade, 2010). Special attention was given by the Ministry of Energy and Natural Resources, the Energy Market Regulatory Authority (EPDK) and other relevant organizations so that energy/climate change policies do not become a barrier for the industrial development (Republic of Turkey – Ministry of Industry and Trade, 2010).

This is reflected by the fact that no additional measures were considered for the industrial sector in the scenarios.

The competitiveness of the country in attracting investments for RES improved in 2012 compared to the previous year due to the latest implemented Law for RES (Ernest & Young, 2012). From the 29th position in 2011 for all types of RES it scaled up to the 26th position for 2012 (Ernest & Young, 2012). The impacts of this policy portfolio (OPT scenario) are the significant solar activity in 2012 and a commitment by the European Investment Bank for €150m of loans to finance renewable energy and energy efficiency projects as well as exports (Ernest & Young, 2012).

The assigned grades are: BAU – 5, Opt – 5, Pes-3.

Equity: The ratio GHG emission reductions in $MtCO_{2eq}$ to capita is calculated for each scenario (by LEAP) to assess the sub-criterion. In the Opt scenario almost all sectors contributes to emission reductions.

Table 9: Equity measurement.

Scenario	Total amount of GHG emissions ($MtCO_{2eq}$) in 2020	Emission reductions compared to BAU ($MtCO_{2eq}$)	Population in 2020	Ratio reductions tCO_{2eq} per capita
BAU	390.3	0	81000384	0
Opt	188.9	201.4	81000384	2.486
Pes	308.2	82.1	81000384	1.014

Flexibility: The scenarios are compared towards the incentives and the options that they offer to target groups. The Opt scenario offers more options (subsidies, feed in tariffs) compared to the other two ones. So, BAU – 4, Opt – 6, Pes – 5.

Stringency for non-compliance: The scenarios do not foresee penalties, fees and sanctions. So, all are assigned with 4.

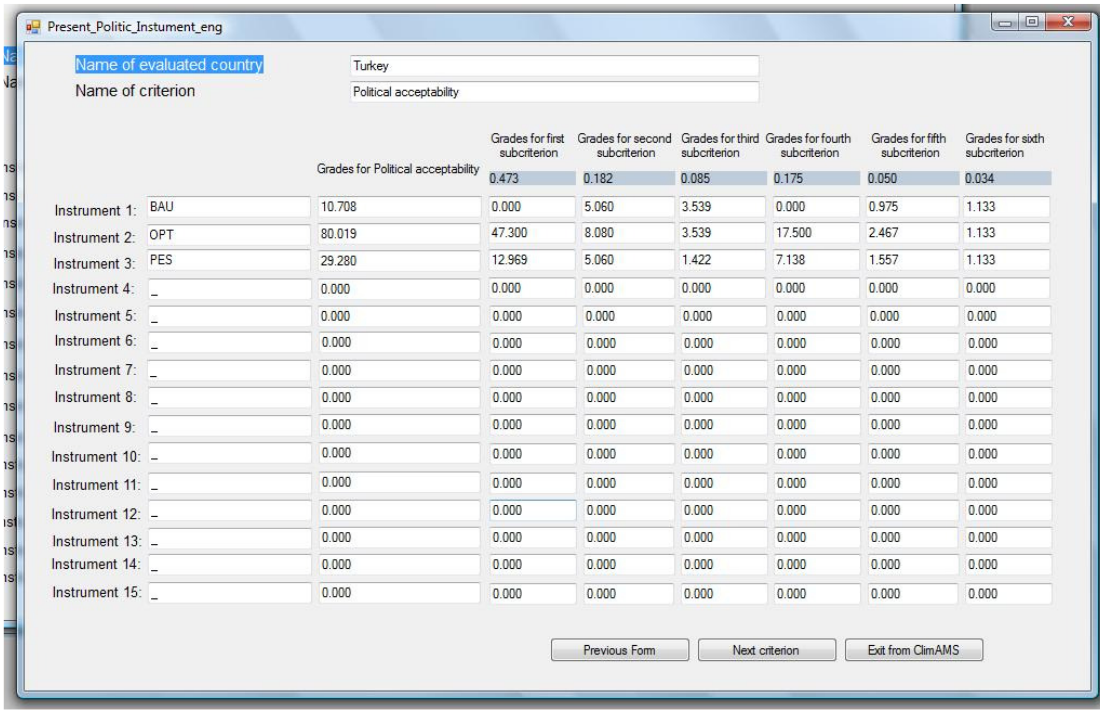

Figure 3: Grades for political acceptability.

Criterion 3: Feasibility of implementation

Implementation network capacity: The Coordination Board on Climate Change was re-established to determine the policies related with climate change in 2004[1]. The Minister of Environment and Forestry[2] is the chairmanship of the Board and all related ministries and institutions are included.

The Climate Change Department of the Ministry of Environment and Urbanization[3] has an e-library with relevant documents, but not organized in a manner to facilitate the user. For mitigation measures, many data and reports are available but there is limited number of official reports regarding climate change adaptation. The web-sites are established to increase awareness about climate change.

[1] http://iklim.cob.gov.tr/iklim/AnaSayfa/IDKK.aspx?sflang=en
[2] the name of the ministry at that year
[3] http://iklim.cob.gov.tr/iklim/AnaSayfa/IDKK.aspx?sflang=en

The Ministry of Energy and Natural Resources[4] in its web-site has a session of publications which is not updated. Its session about "Statistics" is under construction (access – December 2012). The documents on the "Energy-Environment-Climate Change"[5] session are in the Turkish language only.

For implementing a stricter national climate policy and monitoring the effectiveness of policies, the implementation network needs to increase its capacity otherwise it will fail. For BAU the assigned grade is 5, for Opt and Pes is 4.

Administrative feasibility: The Turkish implementation network has poor performance. Only one National Communication to UNFCCC was published in 2007. The second National Communication is not yet prepared. There are no recent studies or reports regarding the performance of the current policy portfolio or for related climate change issues. The assigned grades are 4 for all scenarios.

Financial feasibility: The country has limited incentives for the existing policy instruments. The current policy portfolio does not perform well under this sub-criterion. In OPT scenario, it is assumed that the infrastructure of carbon trading and carbon market will be established, in the context of sustainable financing mechanisms related to energy efficiency and renewable energy sources. The grades are: BAU – 4, Opt – 5, Pes – 4.

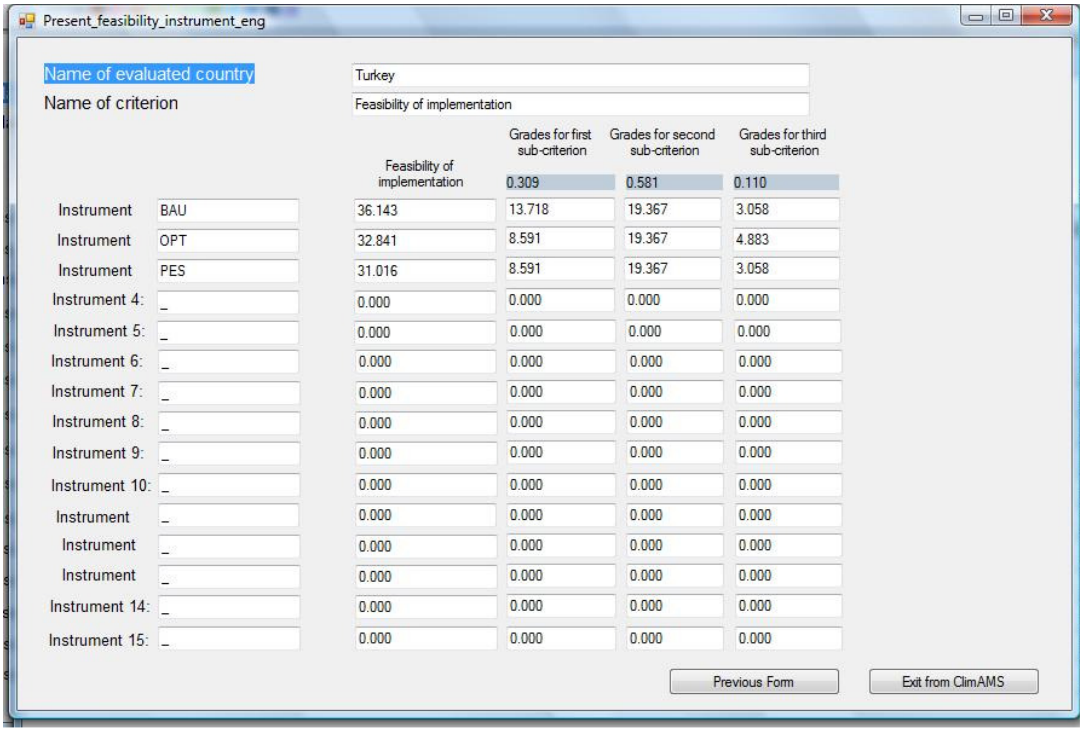

Figure 4: Grades for feasibility of implementation.

[4] http://www.enerji.gov.tr/index.php?dil=en&sf=webpages&b=yayinlar_raporlar_EN&bn=550&hn=&id=40721
[5] http://www.enerji.gov.tr/index.php?dil=en&sf=webpages&b=enerji_cevre_iklim_EN&bn=218&hn=&id=40720

Results of AMS

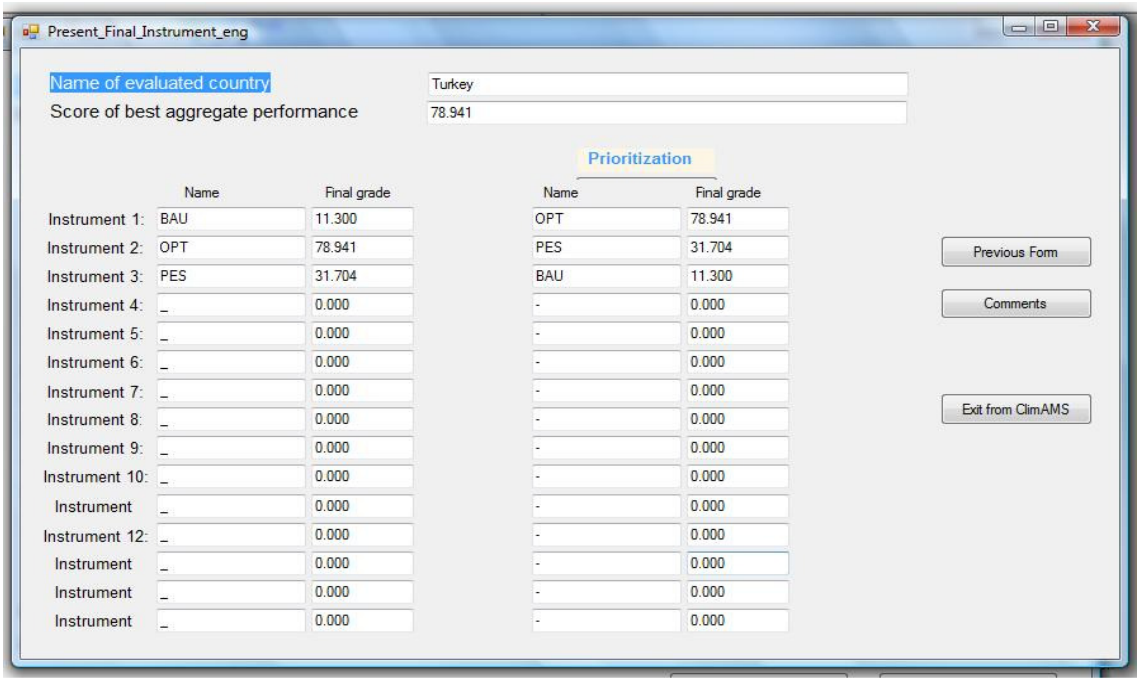

Figure 5: Final grades for the scenarios.

Table 10: AMS results for each scenario.

Criteria	**Scenarios**		
	BAU	**Opt**	**Pes**
Direct contribution to GHG emission reductions (0.833)	0	83.300	33.949
Indirect environmental effects (0.167)	0	16.700	8.787
Environmental performance (0.168) - A	**0**	**100.00**	**42.736**
Cost efficiency (0.473)	0	47.300	12.969
Dynamic cost efficiency (0.183)	5.060	8.080	5.060
Competitiveness (0.085)	3.539	3.539	1.422
Equity (0.175)	0	17.500	7.138
Flexibility (0.050)	0.975	2.467	1.557
Stringency for non-compliance (0.034)	1.133	1.133	1.133
Political acceptability (0.738) - B	**10.708**	**80.019**	**29.280**
Implementation network capacity (0.309)	13.718	8.591	8.591
Administrative feasibility (0.581)	19.367	19.367	19.367
Financial feasibility (0.110)	3.058	4.883	3.058
Feasibility of implementation (0.094) - C	**36.143**	**32.841**	**31.016**
Total (A+B+C)	**11.300**	**78.941**	**31.704**

Comments

The all results for each scenario are presented in Table 17. The Opt scenario is the scenario with better environmental performance, political acceptability and feasibility of implementation compared to the other two scenarios.

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CONCLUSIONS

This report concerns the development and assessment of three (3) climate change mitigation and adaptation policy scenarios for Turkey. Each of them is characterized by a different policy portfolio and is named after it as Business As Usual (BAU), Optimistic (OPT) and Pessimistic (PES).

Turkey does not have a quantified emission limit or reduction commitment for the first commitment period (2008-2012) under the Kyoto Protocol. Nevertheless, being a candidate for EU membership and for full membership in Energy Community, Turkey designed its climate change policy based on the promotion of RES and energy efficiency. Particularly, the country intends to increase the share of RES in electricity generation up to at least 30% by 2023.

BAU scenario

The BAU scenario concerns the time evolution of the already implemented mitigation and adaptation policy instruments (set into force before 31 December 2010) in Turkey until the year 2050 and serves as the reference against which the outcomes of the other scenarios are compared.

The currently implemented Turkish mitigation policy focuses mainly on the energy sector which is the major source of GHG emissions and stimulates: i) penetration of RES in electricity production and ii) energy efficiency of thermal power plants and energy-efficient lighting. Concerning the adaptation policy, no policy measures are implemented.

Energy demand as well as GHG emissions overdoubled within the 20-year period 1990-2010. According to the outcomes of the LEAP model for the BAU scenario, GHG emissions in Turkey will increase by 269% in 2020 and by 1104% in 2050 compared to the year 1990[6]. Compared to the year 2010, the emissions will increase by 70.13% and by 455% respectively. The share of RES in electricity generation in 2023 will be 26.5%.

OPT scenario

The Optimistic scenario concerns the time evolution of an enhanced Mitigation/Adaptation policy portfolio that Turkey will implement during the time interval 2011 - 2050. This enhanced policy portfolio takes into account the policy instruments adopted after 1st January 2011 as well as plans and strategies of the country and targets to: i) the maximum reduction of GHG emissions through the maximum exploitation of the potential of the country in energy efficiency and renewable energy sources and the improvement of network capacity as well as ii) the necessary infrastructure for the adaptation of the country towards the minimum climate change impacts. The main characteristics of this policy portfolio are: the promotion of RES, the introduction of energy efficiency measures in all sectors and the implementation of adaptation activities mostly on the agricultural sector based on the expected needs.

According to the outcomes of the LEAP model for the OPT scenario, GHG emissions in Turkey will increase by 78.62% in 2020 and by 882.8% in 2050 compared to the year 1990, while compared to the year 2010, there will be a decrease of 17.66% and an increase of 353.05% respectively. The share of RES in electricity generation in 2023 will be 47.7%, almost 20% more than BAU because of the introduction of solar and the increased penetration of wind, hydro and geothermal in electricity generation through the reinforced feed-in tariff system and the increased amount of subsidies.

[6] The GHG emission sources which are taken into consideration in this study are mostly those related to the mitigation policy measures which are implemented due to missing data.

PES scenario

The Pessimistic scenario is structured by: i) the Mitigation/Adaptation policy instruments that the country has set into force after 1st January 2011; ii) no other additional policy instruments apart from those already decided to be implemented and in line with the EU climate change policy; the EU policy instruments will be adjusted to the needs and priorities of the Turkey and iii) the minimum exploitation of the potential of the country in energy efficiency and renewable energy sources by limiting the possible technological options to the energy and transport sectors. These sectors have the highest potential in energy efficiency and hydro and wind are the most promising RES. In this scenario, the adaptation measures concern the agricultural sector which is an important component of the national economy.

According to the outcomes of the LEAP model for the PES scenario, GHG emissions in Turkey will increase by 191.4% in 2020 and by 1023% in 2050 compared to the year 1990 while compared to the year 2010, they will increase by 34.35% and by 417.7% respectively. The share of RES in electricity generation in 2023 will be 46.9%.

Assessment of outcomes[7]

Using the multicriteria method AMS, the three (3) policy portfolios were assessed against their environmental performance (amount of GHG emissions and secondary environmental effects), political acceptability (attitude of the involved entities (target groups) towards the relevant policy portfolio) and feasibility of implementation (applicability of the policy portfolio from the point of the governmental and national pertinent entities).

The BAU scenario is characterized by the highest final energy consumption and the worst environmental performance, compared to the other scenarios, which results from the limited number of mitigation and adaptation policy instruments. PES is characterized by moderate environmental performance while OPT has the lowest amount of GHG emissions and the lowest energy consumption.

The policy portfolio of the OPT scenario is overall the most promising since, apart from the best performance towards the reduction of GHG emissions, it ends up as the most cost effective, especially for certain target groups (buildings, industrial sector) and the most fair towards the contribution of the sectors to emission reductions offering more incentives and options (subsidies, feed in tariffs) to target groups compared to the other two policy portfolios. Nevertheless, following the Optimistic scenario, implementing a stricter national climate policy and monitoring the effectiveness of policies requires the increase of the implementation network capacity and performance, as well as an organized, updated and easily accessible e-library with documents regarding mitigation and adaptation climate change issues available in English language.

Trying to preserve the competitiveness of the most important sectors of the country's economy such as agriculture and industry, no additional measures for OPT and PES scenarios were considered for these sectors so that energy/climate change policies do not become a barrier for their development.

Given the above, the mitigation/adaptation policy portfolio which characterizes the Optimistic scenario is the one to achieve most of the goals of the climate change policy of Turkey. Nevertheless, the success of this policy portfolio requires the effective performance and organisation of the implementation network, a more stringent frame for non-compliance which will foresee penalties, fees or sanctions and the establishment of carbon trading in the context of sustainable financing mechanisms related to energy efficiency and renewable energy sources. Turkey is an emerging economy with a high rate of economic and population growth, resulting in high levels of GHG emissions. In order to maintain or reduce the emissions for the period beyond 2020, additional measures will be necessary.

[7] The assessment outcomes depend on the level of expertise of the person who makes the assessment as well as the degree of justification concerning the sub-criteria.

In this report, the component of adaptation in climate change policy is not fully developed since the country hasn't set an adequate framework to reduce its vulnerability to climate change. Moreover, the design and assessment of relevant policy instruments require data related with the frequency of extreme events, water resources and use, low-income groups, biodiversity, the health sector, etc., which are not available at the moment.

Concluding, the scenarios of this report were developed under the same assumptions for the evolution of GDP and population for the period 2011-2050. In order to perceive the performance and applicability of the three (3) policy portfolios, the report should include six (6) more scenarios with the combinations "low population growth – high GDP growth" and "high population growth – low GDP growth", according to the socioeconomic frameworks presented in the IPCC pathways (new generation of IPCC scenarios).