



Macedonia's Fourth National Communication and Third Biennial Update Report on Climate Change under the UNFCCC

(UNDP Project no. 00110592)

Report on NDC – SDG synergies and trade-offs in Macedonian conditions

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Abstract

This document is a product of the second phase of the assignment for Identification and Evaluation of Synergies and Trade Offs between the Enhanced Macedonian NDC and SDGs. It presents the SCAN tool and the newly developed Q-SCAN tool, as well as results as graphs with qualitative and quantitative information on the synergies and trade-offs between the national enhanced NDC and the SDGs for the three sectors individually and the overall impacts of the three sectors of the enhanced NDC on the realization of each SDG. At the end, a set of recommendations is provided including analyses for the remaining five sectors, dissemination of the results at national and international level, involvement of as many as possible different stakeholders in technical analyses, as well as use of terminology for policies and measures recognized by the SCAN tool.



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This document is prepared as part of the preparation of the enhanced National Determined Contribution (NDC) which the Ministry of Environment and Physical Planning of North Macedonia is preparing with the financial support from GEF and UNDP under the framework of the initiative Climate Promise

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1 Introduction

1.1 The Aim of the Assignment

The overall objective of the assignment is to identify and evaluate synergies and trade-offs between climate actions stipulated in the revised Macedonian NDC and the Sustainable Development Agenda being pursued by the country. SDG Climate Action Nexus tool (SCAN-tool) is used to **identify** how specific mitigation actions from the enhanced NDC may lead to impacts – either positive or negative – on the SDGs at the SDG target level. Then, a method called Q-SCAN tool is developed to **quantify** the identified impacts capturing the different perspectives and views of a group of relevant stakeholders. The final result of this assignment is to be included in the **separate chapter (section) of the enhanced NDC** submission document dedicated to SDG-NDC nexus.

1.2 Workflow

Following the TOR for Individual Consultant for Identification and Evaluation of Synergies and Trade Offs between the Enhanced Macedonian NDC and SDGs, the assignment has been conducted in two phases.

The first phase was mainly desk research where progress of the SDG agenda was analyzed through review of relevant national documents (Gap Analyses 2016, Rapid Integrated Assessment 2020, Voluntary National Review 2020, and SSO: Sustainable Development Goals 2019) and at international level, presenting online platforms for tracking SDGs (SDG Tracker and Sustainable Development Report 2020), as well as reviewing some recent assessments of international institutions which address either the SD progress or the COVID-19 context (UNECE Environmental Performance, UNDP Socio Economic Assessment of COVID-19's Impact in North Macedonia, OECD Multi-dimensional Review of the Western Balkans (first draft)). Also NDC progress was elaborated (i) at the national level, considering SBUR, TBUR and the draft NECP, (ii) at local level, through Skopje Climate Change Strategy – Resilient Skopje, as well as (iii) at international level, presenting the Climate Action Tracker. Finally, as theoretical introduction to the second phase of the assignment, CC mitigation – SD synergies and trade-offs were summarized by mitigation sector. The review work was elaborated in the **deliverable D1**, entitled **“Tracking the SDGs and NDC”**

The second phase (Figure 1) includes the **adoption and the application of the SCAN-tool** to identify the impacts of the mitigation actions from the enhanced NDC to SDGs. In this phase, also a method for quantification of the identified impacts in a participatory manner (**Q-SCAN tool, deliverable D2**) was developed. A participatory workshop (webinar) was conducted with the most relevant stakeholders and UNDP team in order to utilize both tools on the Macedonian case - enhanced Macedonian NDC and SDGs in Macedonian context. The consultant designed, prepared and moderated the workshop. The results are summarized in a **report on SDG-NDC synergies and trade-offs in Macedonian conditions (deliverable D3)**, which will serve as an entry point to the chapter (section) dedicated to SDG-NDC nexus of the enhanced NDC submission document.

The goal of the D3 is to present a methodology for identifying the synergies and trade-offs between national enhanced NDC and SDGs. In the case of the Republic of North Macedonia, the links between 63 national climate change mitigation actions (enhanced NDC) and 15 SDGs were identified

using the SCAN tool. To achieve this, the national enhanced NDC was first translated into the terminology recognized by the SCAN tool. Then, using the SCAN tool, the synergies and trade-offs between each of the 63 measures and 15 SDGs were identified by selecting from a pool of 982 possible links and determining which links are relevant on a national level.

The state-of-the-art scientific literature was used to develop the methodology for quantification of impacts (we called it Q-SCAN tool), having in mind that it should be simple enough that it enables wide engagement of various stakeholders. The process involved (1) weighting each synergy and trade-off based on expert judgement and (2) scoring the identified links using algebraic operations which aggregate the previously defined weights. The methodology was separately applied to 3 sectors (Electricity & heat, Buildings, Transport), as an example to confirm its applicability and effectiveness. The results were given as graphs with qualitative and quantitative information on the synergies and trade-offs between the national enhanced NDC and the SDGs for the three sectors individually, as well as the overall impacts of the three sectors of the enhanced NDC on the realization of each SDG

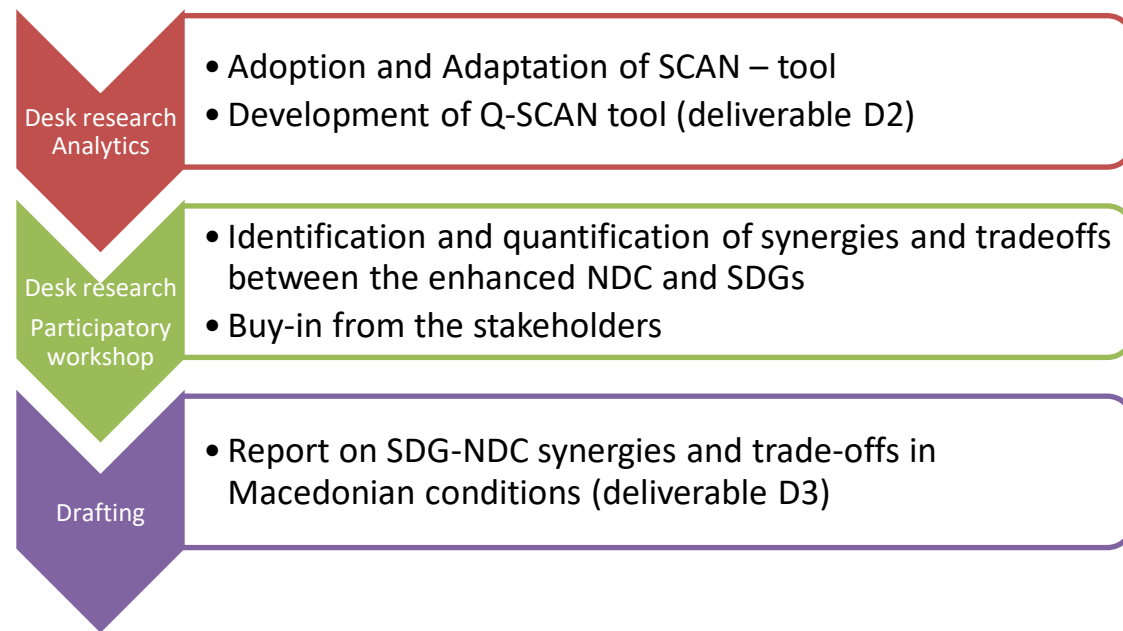


Figure 1. Second phase of the Assignment

2 SDG Climate Actin Nexus tool (SCAN tool)

The SDG Climate Action Nexus tool (SCAN-tool) is designed to provide high-level guidance on how climate actions can impact the achievement of the Sustainable Development Goals (SDGs). It is a user-friendly and practical tool which is meant to identify potential impacts (positive or negative) of the climate actions (policies and measures (PAMs)) on the targets of the Sustainable Development Goals (SDGs). The final result is a better understanding of how climate action can reinforce the achievement of SDG targets. SCAN-tool is developed separately for mitigation and for adaptation.

The SCAN-tool for mitigation covers actions across sectors related to activities that produce emissions and the actions that can be implemented to reduce the emissions. Those sectors, total 8, include: (1) Electricity and Heat, (2) Transport, (3) Buildings, (4) Industry, (5) Waste, (6) Agriculture, and (7) Forestry plus a sector with (8) General PAMs. Each mitigation action falls into one of three broad categories: (1) Changing Activity, (2) Reduce Emissions Intensity, and (3) Increase Energy Efficiency. The General PAMs sector includes measures from the following categories: Awareness, Capacity, Finance, Pricing and Innovation. For the Electricity and Heat sector, only the Emissions Intensity and Energy Efficiency categories are relevant, for Transport, Buildings, Industry and Waste sectors, all three categories are relevant, whereas in the case of Agriculture relevant categories are Changing Activity and Reduce Emissions Intensity and in the case of Forestry sector, only the Changing Activity category is relevant. For each sector, each category contains one or more mitigation actions that are specific to that sector.

On the SDGs side, total 15 SDGs are considered. Potential links to SDG 13 are not listed, as these links are implicitly represented in the assessed sectoral mitigation actions. Links to SDG 17 are not included because this goal is about mobilization of international resources to achieve the SDGs and is not a development area comparable to the other SDGs. In total, potential 982 links have been identified, out of which 751 as potential synergies. The tool has a very effective [online graphical presentation](#) backed up with an excel file with sector worksheets, where information about the linkages between actions and the SDGs is entered. The linkages are compiled based on the relevant scientific literature that maps the climate-development links and deals with the nexus between climate action and specific development areas. Therefore, the country relevant exercise of mapping the links would be to go through all comprehensive set of link and extract what is relevant for the country.

The online presentation starts with the Figure 2. The length of the pillar next to the sector name indicates the number of the links the corresponding mitigation PAMs would have with the SDGs targets. The length of the pillar next to the SDG indicates the number of mitigation measures the SDG is impacted by. Also the links are adequately visualized using different colors for sectors and SDGs and with the variable thickness of the connections which depends on the number of the identified links.

Using filters located in the upper left corner, beneath the Sectors circle, the links can be presented for each sector (see example Figure 3) and for each SDG (see example Figure 4)

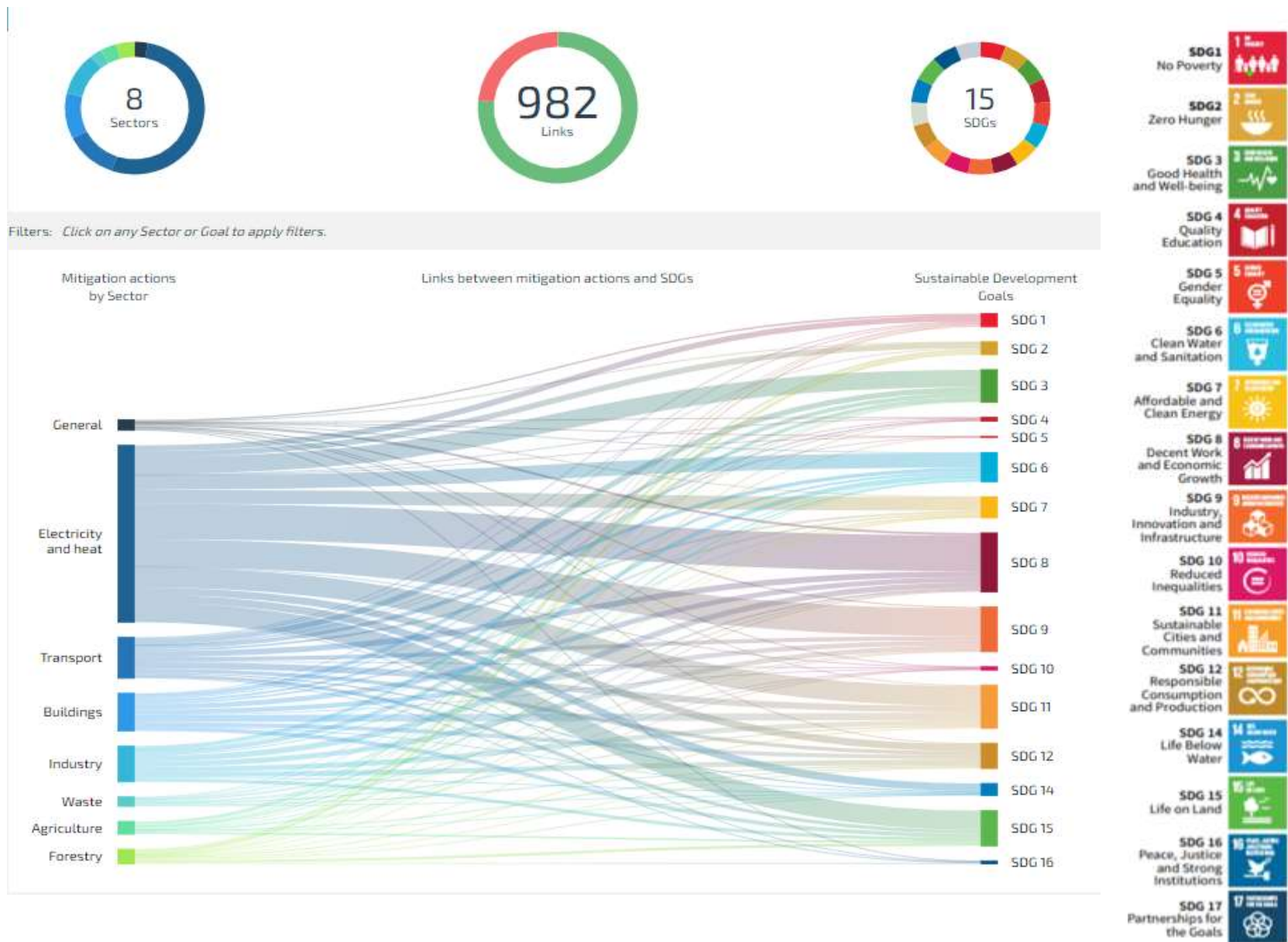


Figure 2. Starting screen of the SCAN tool (comprehensive representation of all identified links between mitigation actions and SDGs)

Hence, the buildings sector has 109 links to 12 SDGs, out of which 96 are synergies (green color on the circle in the middle). The highest impact is with SDG11 (dark yellow color) as its pillar is the longest, while SDG14 is the least impacted SDG (Figure 2).

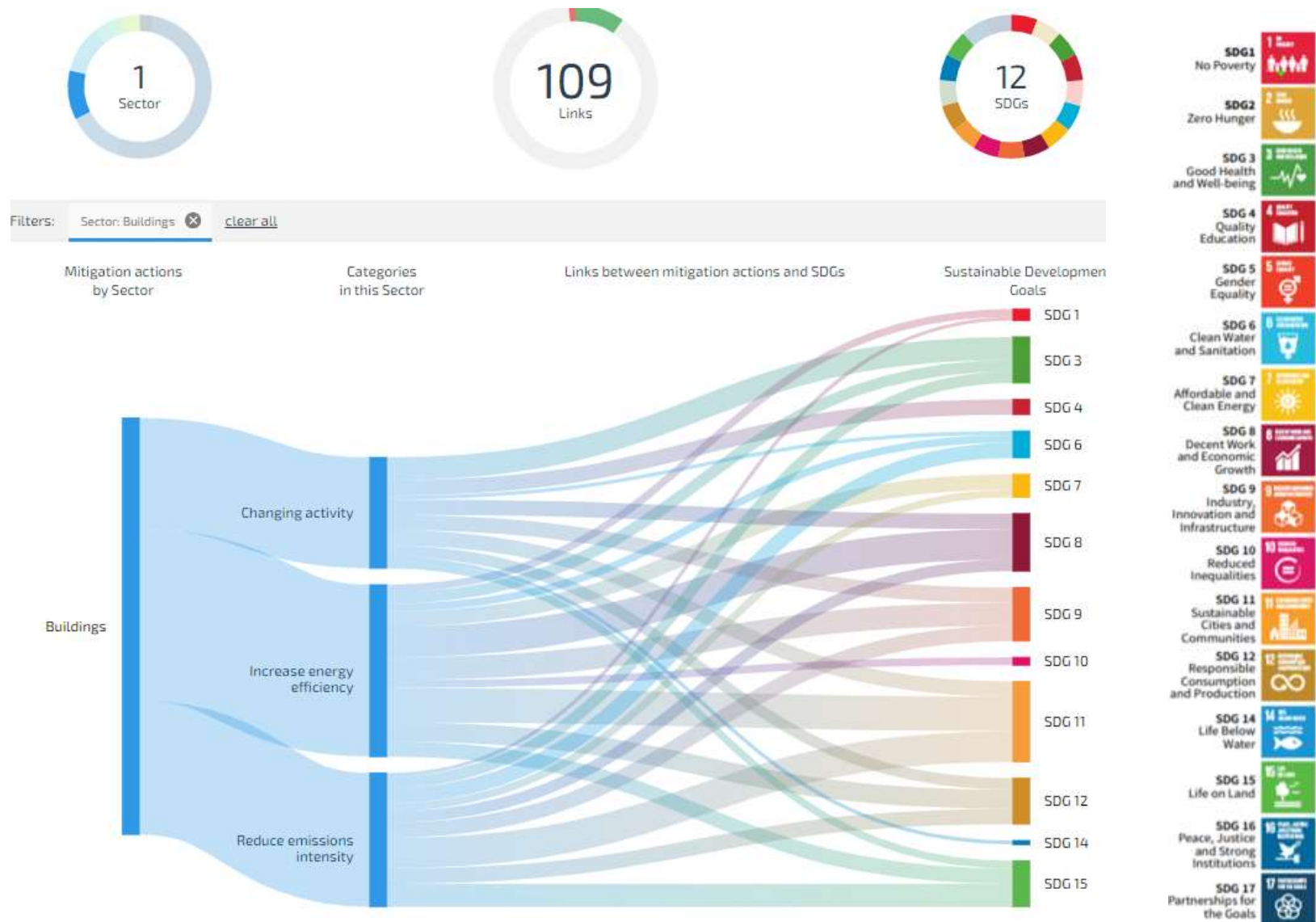


Figure 3. Links of the Buildings sector

The SDG 3 (Good health and well-being) is impacted by 94 mitigation PAMs from 6 sectors, out of which 23 are tradeoffs (red color on the circle in the middle). Most impacts to SDG3 comes from the Electricity and Heat sector, while the waste sector is less impactful to this SDG. (Figure 3).



Figure 4. Impacts on the SDG 3 (Good health and well-being)

Also one can easily see how many links are identified between mitigation PAMs from a given sector category and a given SDG. For example, the Changing Activities PAMs from the Transport sector have 10 links to SDG8 (Decent work and economic growth), 9 synergies and 1 trade-off. (Figure 5).

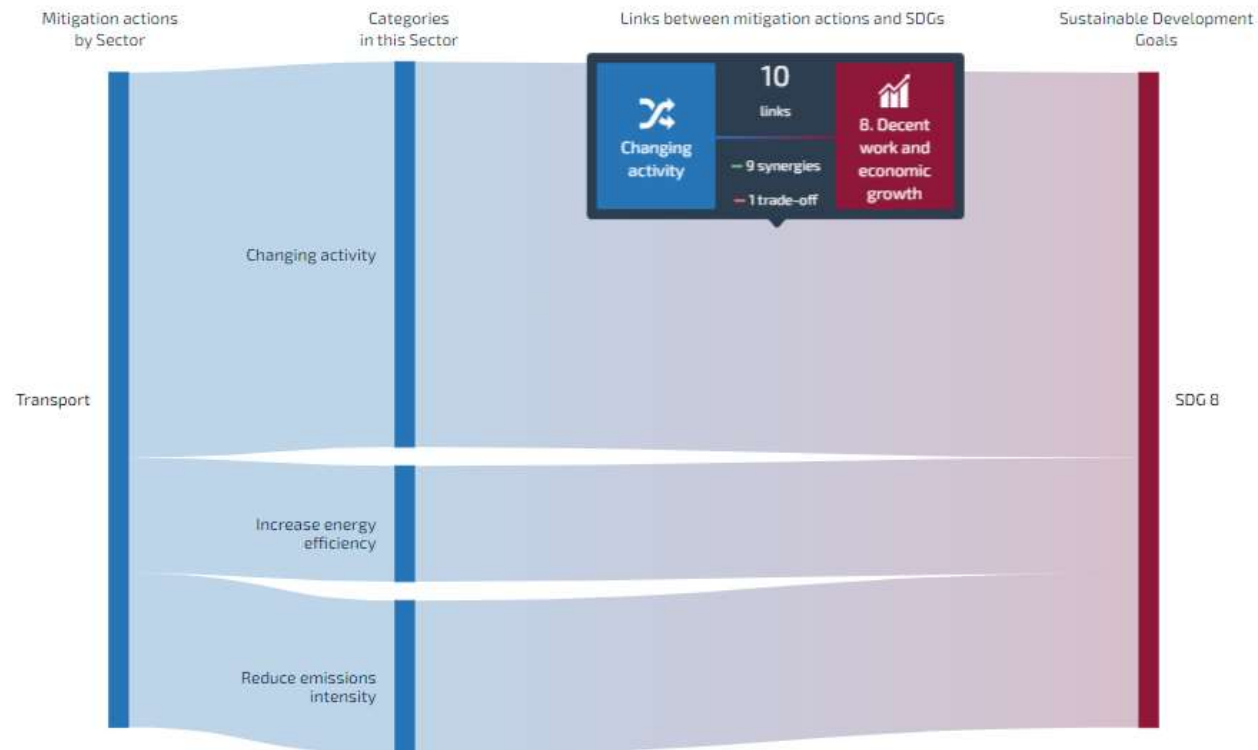


Figure 5. Links between given sector category and given SDG (Example: Transport – SDG8 Decent work and economic growth)

The online presentation can go further, at a single link level. One example is presented in Figure 6. It is about Renewable energy: Small-hydro measure which belongs to Reduce Emissions Intensity category of the Electricity and Heat sector. This measure could have potential negative impact on water scarcity of local communities due to restricted water access. In other words, that is potential trade-off with Target 6.4 of the SDG6 (Clean water and sanitation) which reads: By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity.



Figure 6. Example of a link (potential synergy or trade-off)

Finally, coming to the background excel document, in each one of the sector sheets, the linkages were classified as either positive (cell marked in green) – where the mitigation action is likely to reinforce the SDG target, or negative (cell marked in orange) – where there may be a negative impact on the SDG target. The score attributed to a linkage is only indicative of whether it is likely to be positive or negative. The tool does not assess the magnitude of the linkage. An example for the climate actions from Electricity and Heat sector and a target from SDG 1 (No poverty) is shown in Figure 7.

Goal	Targ	Target text	Category	Mitigation action	Link	Description of link
	1.1	By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than \$1.25 a day				
	1.2	By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions	Reduce emissions intensity	Renewable energy: Off-grid	Green	Off-grid renewable energy can help reach remote communities, increasing access to energy (energy poverty reduction), and enabling productive economic activities. Access to electricity also enables refrigerated food storage that can increase food availability year-round for communities at risk of hunger.
1. No poverty	1.2	By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions	Reduce emissions intensity	Renewable energy: Bioenergy	Green	Large-scale bioenergy production could lead to the creation of agricultural jobs, as well as higher farm wages and more diversified income streams for farmers
	1.2	By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions	Reduce emissions intensity	Renewable energy: Bioenergy	Orange	Biofuels production can lead to land price increase, with impact on food prices which could reduce food access.
	1.2	By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions	Reduce emissions intensity	Renewable energy: Ocean	Orange	Most ocean energy technologies are not commercially mature and deployment will likely lead to increased energy prices

Figure 7. Indicative example for organization of the data in the excel based document behind the SCAN tool

Having understanding of all these features, nexus mapping exercise can be conducted utilizing the SCAN tool to deep dive into and analyze all this comprehensive and general information visualized online and incorporated into the background excel file in order to identify a country specific nexus.

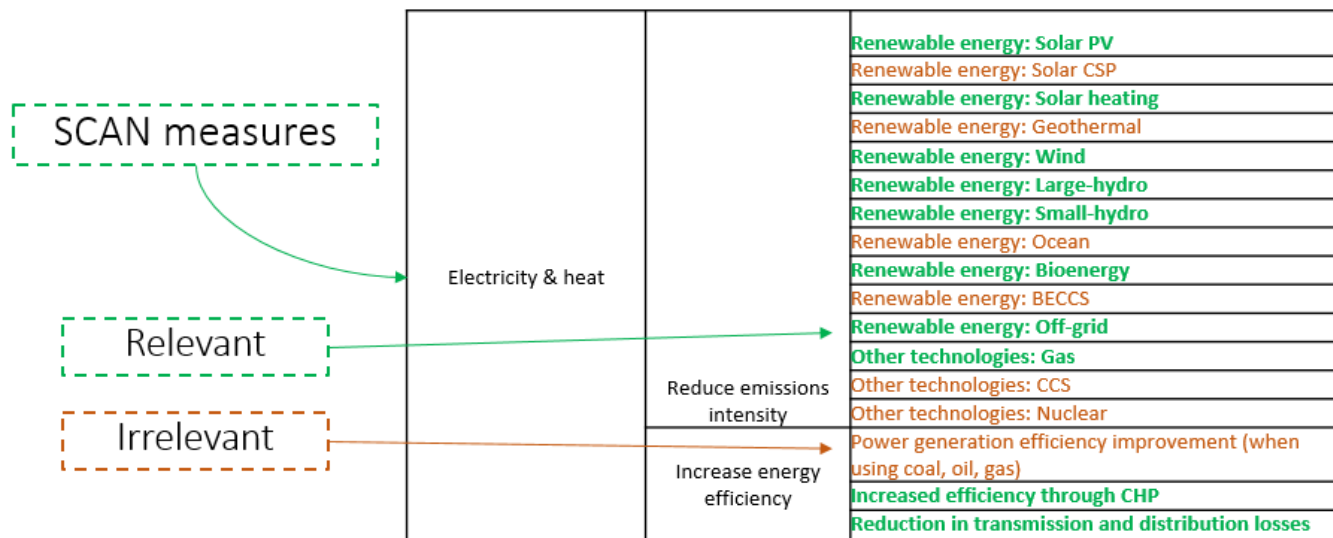
2.1 Translation of the Macedonian enhanced NDC measures into SCAN measures

The SDG-NDC nexus mapping exercise in Macedonian conditions is conducted with the mitigation actions from the draft NECP (which is expected to be taken as Macedonian enhanced NDC) and which contains in total 63 actions as follows:

- Decarbonization – 26 mitigation actions
- Energy efficiency – 25 mitigation actions
- Internal electricity market – 8 mitigation actions
- R&D and competitiveness – 4 mitigation actions

The practical application of the SCAN tool should start with a translation of the mitigation actions into SCAN measures. That means synchronizing the nomenclature and classifying the mitigation actions (determining what goes where).

Firstly, the SCAN mitigation measures relevant for the country should be identified:



Secondly, all enhanced NDC mitigation actions should be distributed across the relevant SCAN mitigation actions. Some SCAN mitigation action may integrate more than one NDC action, and vice versa. The ultimate goal is to allocate every single NDC action under at least one SCAN mitigation action.

SCAN methodology

Enhanced NDCs

Reduce emissions intensity	Renewable energy: Solar PV	PM_D23 Solar rooftop power plants; PM_D17: Identification of the proper location for solar and wind power plants; PM_D19: RES without incentives;
	Renewable energy: Solar CSP	
	Renewable energy: Solar heating	PM_D24 Solar thermal collectors
	Renewable energy: Geothermal	
	Renewable energy: Wind	PM_D17: Identification of the proper location for solar and wind power plants; PM_D19: RES without incentives;
	Renewable energy: Large-hydro	PM_D18 Large hydro power plants
	Renewable energy: Small-hydro	PM_D21: Incentives feed-in tariff;
	Renewable energy: Ocean	
	Renewable energy: Bioenergy	PM_D25 Biomass power plants (CHP optional); PM_D19: RES without incentives;
	Renewable energy: BECCS	
	Renewable energy: Off-grid	PM_D20: Photovoltaic Irrigation
	Other technologies: Gas	PM_IEM2: Develop natural gas cross-border infrastructure to diversify supply routes and increase market competitiveness; PM_IEM3: Develop gas transmission network; PM_IEM4: Develop gas distribution network
	Other technologies: CCS	
Other technologies: Nuclear		
Increase energy efficiency	Power generation efficiency improvement (when using coal, oil, gas)	
	Increased efficiency through CHP	PM_EE23: Increased use of central heating systems; PM_D25: Biomass power plants (CHP optional)
	Reduction in transmission and distribution losses	PM_EE25: Reduction of network losses; PM_IEM1: Construction of 400 kV electricity transmission interconnection Macedonia-Albania (Bitola-Elbasan); PM_IEM6: Develop further distribution system network to integrate more RES, including prosumers and more electric vehicles (EVs), as well as continuously improve network reliability

Final result is a table populated as presented below:

This step is performed for all 63 NDC measures and all 8 SCAN sectors

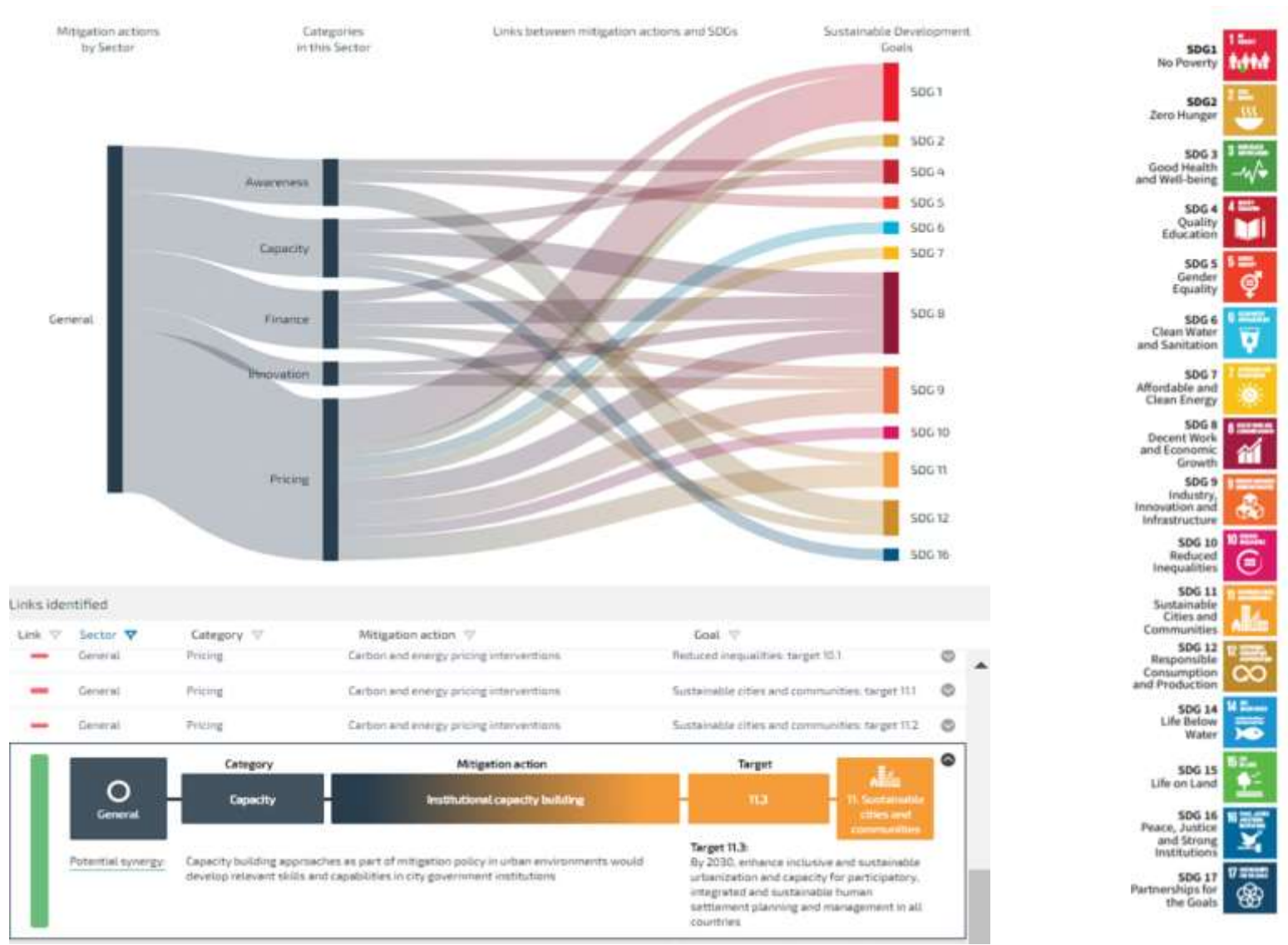
Electricity & heat	Reduce emissions intensity	Renewable energy: Solar PV	PM_D23 Solar rooftop power plants; PM_D17: Identification of the proper location for solar and wind power plants; PM_D19: RES without incentives;
		Renewable energy: Solar heating	PM_D24 Solar thermal collectors
		Renewable energy: Wind	PM_D17: Identification of the proper location for solar and wind power plants; PM_D19: RES without incentives;
		Renewable energy: Large-hydro	PM_D18 Large hydro power plants
		Renewable energy: Small-hydro	PM_D21: Incentives feed-in tariff;
		Renewable energy: Bioenergy	PM_D25 Biomass power plants (CHP optional); PM_D19: RES without incentives;
		Renewable energy: Off-grid	PM_D20: Photovoltaic Irrigation
	Other technologies: Gas	PM_IEM2: Develop natural gas cross-border infrastructure to diversify supply routes and increase market competitiveness; PM_IEM3: Develop gas transmission network; PM_IEM4: Develop gas distribution network	
	Increase energy efficiency	Increased efficiency through CHP	PM_EE23: Increased use of central heating systems; PM_D25: Biomass power plants (CHP optional)
		Reduction in transmission and distribution losses	PM_EE25: Reduction of network losses; PM_IEM1: Construction of 400 kV electricity transmission interconnection Macedonia-Albania (Bitola-Elbasan); PM_IEM6: Develop further distribution system network to integrate more RES, including prosumers and more electric vehicles (EVs), as well as continuously improve network reliability

Relevant SCAN measures

Enhanced NDCs

2.2 Identification of the relevant synergies and trade-offs

Once we have translated the NDC mitigation actions into SCAN space, we continue working with SCAN mitigation actions which correspond to the NDC. We can use the visual tool to identify and note the relevant links as presented below.

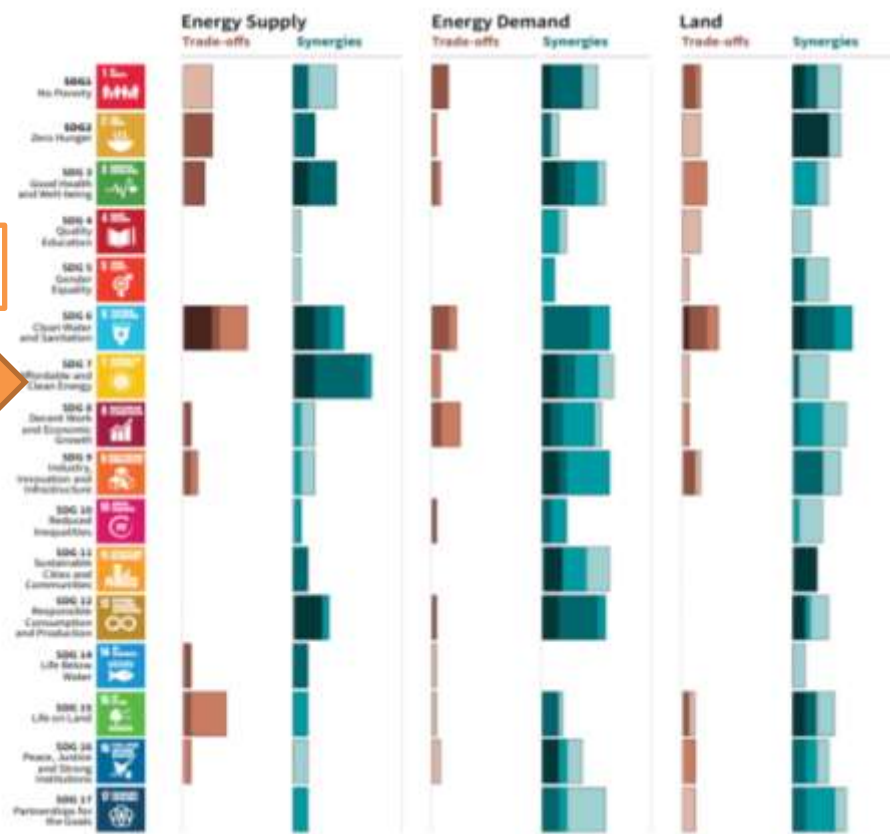
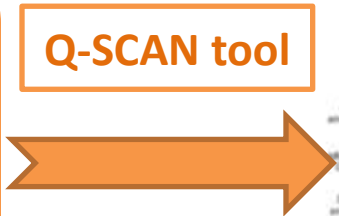


Notes for the identified relevant links are inserted in the excel tables created in the previous step.

3 Quantifying the identified synergies and trade-offs (Q-SCAN tool)

Motivated by the analyses conducted for IPCC 1.5C report which quantifies and excellently visualizes the synergies and trade-offs between three mitigation sectors (Energy Supply, Energy Demand and Land) and SDGs, a methodology for quantification of the identified SDG-NDC nexus in Macedonian conditions is developed (Q-SCAN tool). This enables the same analyses from the IPCC 1.5C report to be conducted in Macedonian conditions (for Macedonian enhanced NDC). The analysis results in a high quality graphical representation of the results, enabling effective communication and comprehending of the enhanced NDC contribution to the Agenda 2030.

- Enhanced NDCs
- Policies and measures on a national level



Source: Global Warming of 1.5°C – A Summary for Policy Makers, IPCC, 2019, pp.23

Guiding principles of the Q-SCAN tool are drawn from state-of-the-art literature:

- Nilsson, M., Griggs, D. and Visbeck, M., 2016. Policy: map the interactions between Sustainable Development Goals. *Nature*, 534(7607), pp.320-322.
- Nilsson, M., Chisholm, E., Griggs, D., Howden-Chapman, P., McCollum, D., Messerli, P., Neumann, B., Stevance, A.S., Visbeck, M. and Stafford-Smith, M., 2018. Mapping interactions between the sustainable development goals: Lessons learned and ways forward. *Sustainability science*, 13(6), pp.1489-1503.

The Q-SCAN tool is simple enough to enable participation and wide engagement of various stakeholders which is an ultimate contribution to the awareness raising and to the “nobody left behind” principle. However, in its initial application in Macedonian conditions, the exercise was conducted mainly by experts while the stakeholders participated in the capacity building workshop aimed at presentation and discussion of the methodology and results. It is expected that in the next runs, the stakeholders will actively participate in the technical work as well, thus providing valuable input regarding the relevance and the level of importance of some links in the country specific conditions.

3.1 Weighting

Once we have synergies and trade-offs identified, we can continue with the quantification of the identified country specific links. First step in this is the weighting. Three levels of importance (weights) are introduced – low (1), medium (2) and high (3) for synergies, and the same with negative values for the trade-offs - low (-1), medium (-2) and high (-3) (Figure 8). The identified links are examined one by one and assigned a level of importance based on expert judgment.

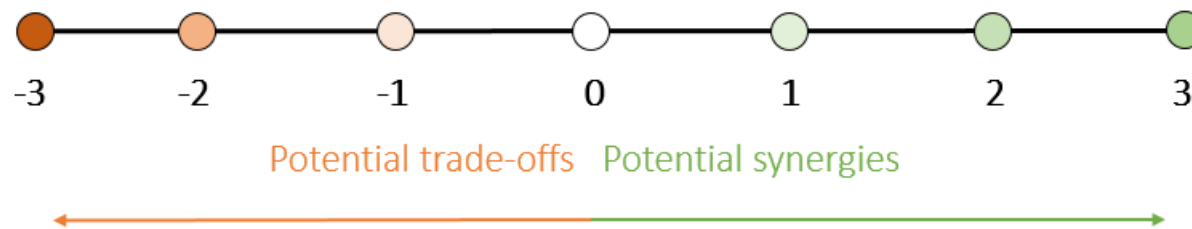


Figure 8. Level of importance of the identified synergies and trade-offs

s.

3.1 Scoring

Scoring is performed by using algebraic operations which aggregate the previously defined weights. The methodology was separately applied to 3 sectors (Electricity & heat, Buildings, Transport), as an example to confirm its applicability and effectiveness.



Score	Potential Synergies			Potential Trade-offs		
	low	medium	high	low	medium	high
SDG1	0	0	0	-1	-2	0
SDG2	1	0	0	0	0	0
SDG3	0	12	9	-1	-2	0
SDG4	0	0	0	0	0	0
SDG5	0	0	0	0	0	0
SDG6	6	0	0	0	0	0
SDG7	0	4	3	0	-2	0
SDG8	4	8	9	-1	-2	0
SDG9	4	10	6	0	0	0
SDG10	0	2	0	0	0	0
SDG11	3	10	6	-2	-2	0
SDG12	3	18	12	-2	-2	0
SDG13	-	-	-	-	-	-
SDG14	-	-	-	-	-	-
SDG15	2	3	3	-1	0	-3
SDG16	0	0	0	0	0	0
SDG17	-	-	-	-	-	-

Example: The sector Electricity and heat impacts on SDG3 through:
 6 medium important synergies (6x2)
 3 highly important synergies (3x3)
 but also
 1 lowly important trade-off (1x1)
 1 medium important trade off (1x2)

Figure 9 Example of scoring for Transport sector

4 Graphical representation

The results were given as graphs with qualitative and quantitative information on the synergies and trade-offs between the national enhanced NDC and the SDGs for the three sectors individually, as well as the overall impacts of the three sectors of the enhanced NDC on the realization of each SDG (Figures 10, 11, 12).

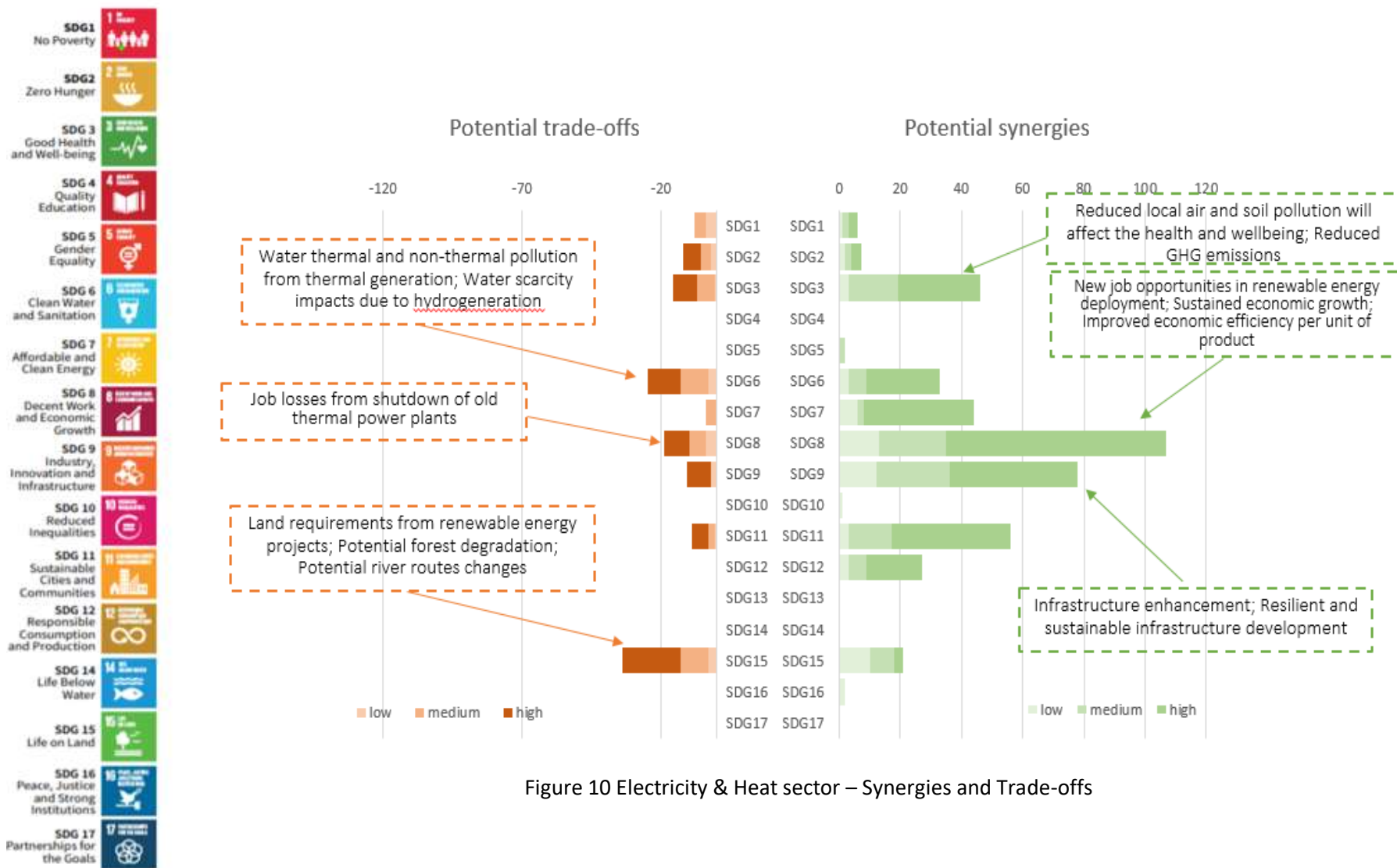


Figure 10 Electricity & Heat sector – Synergies and Trade-offs

Electricity & Heat sector: The strongest synergies are with SDG 8: Decent work and economic growth (score around 110) due to the new job opportunities in renewable energy deployment, sustained economic growth and improved economic efficiency per unit of product. This sector will have largest negative impact on the SDG 15 Life on land (around -35), due to the land requirements from renewable energy projects, potential forest degradation and potential river routes changes. The highest synergies are almost three times stronger than the highest trade-offs.

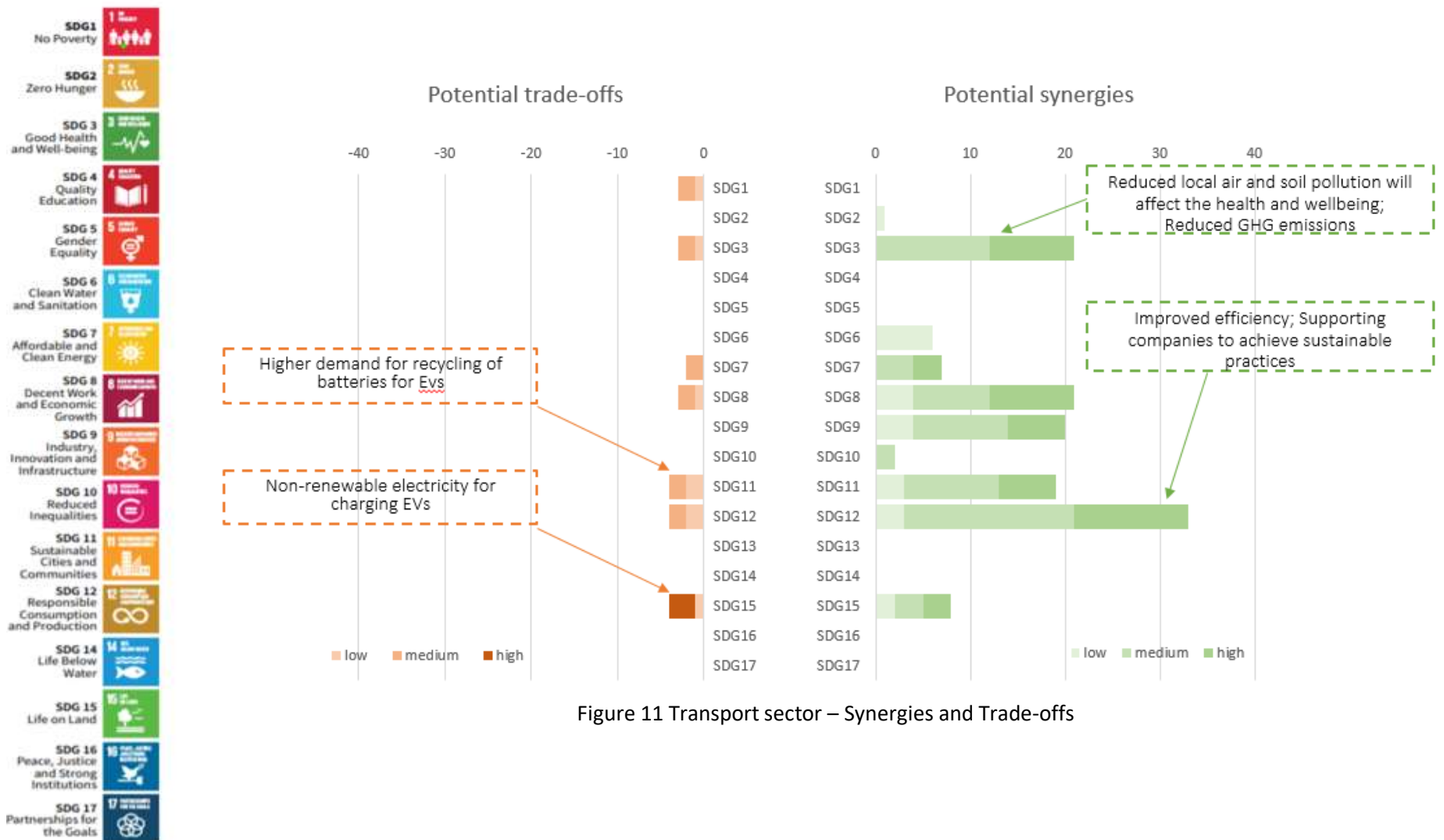


Figure 11 Transport sector – Synergies and Trade-offs

Transport sector: The Figure 11 is self-explanatory. Note should be made on the three times lower scale of scores compared to the ones of Electricity & Heat sector. Trade-offs are identified with much less SDGs, and most of them are with low or medium importance.

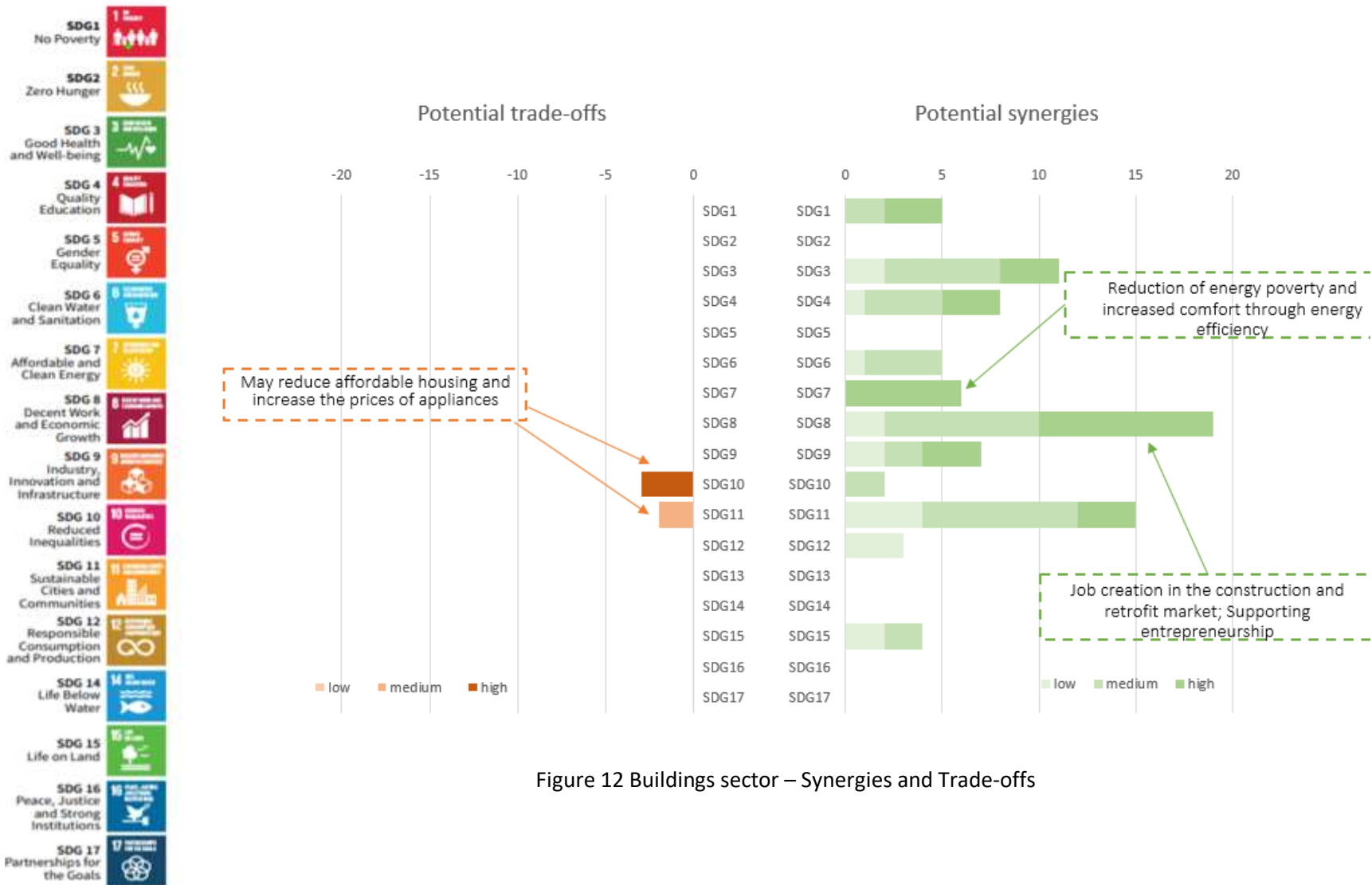


Figure 12 Buildings sector – Synergies and Trade-offs

Buildings sector: The Figure 12 is self-explanatory. Note should be made on the six times lower scale of scores of synergies compared to the ones of Electricity & Heat sector. Trade-offs are identified only with SDG10: Reduced inequalities and SDG 11: Sustainable cities and communities due to possibility for reduction in affordable housing and increase in the prices of the appliances.

Finally, Figure 13 depicts the aggregated synergies and trade-offs of the three sectors represented individually above. It can be seen that the pattern of integral scores follows the pattern of the sector Electricity & Heat, which indicates that this sector is dominant in influencing the SDGs. The strongest synergies remain with SDG 8: Decent work and economic growth (score around 150) due to the new job opportunities in renewable energy deployment and in the construction and retrofit market; sustained economic growth, improved economic efficiency per unit of product and sustained support of entrepreneurship. The largest negative impact is on the SDG 15 Life on land (around -40), due to the land requirements from renewable energy projects, potential forest degradation and potential river routes changes. However, the highest synergies are almost three times stronger than the highest trade-offs

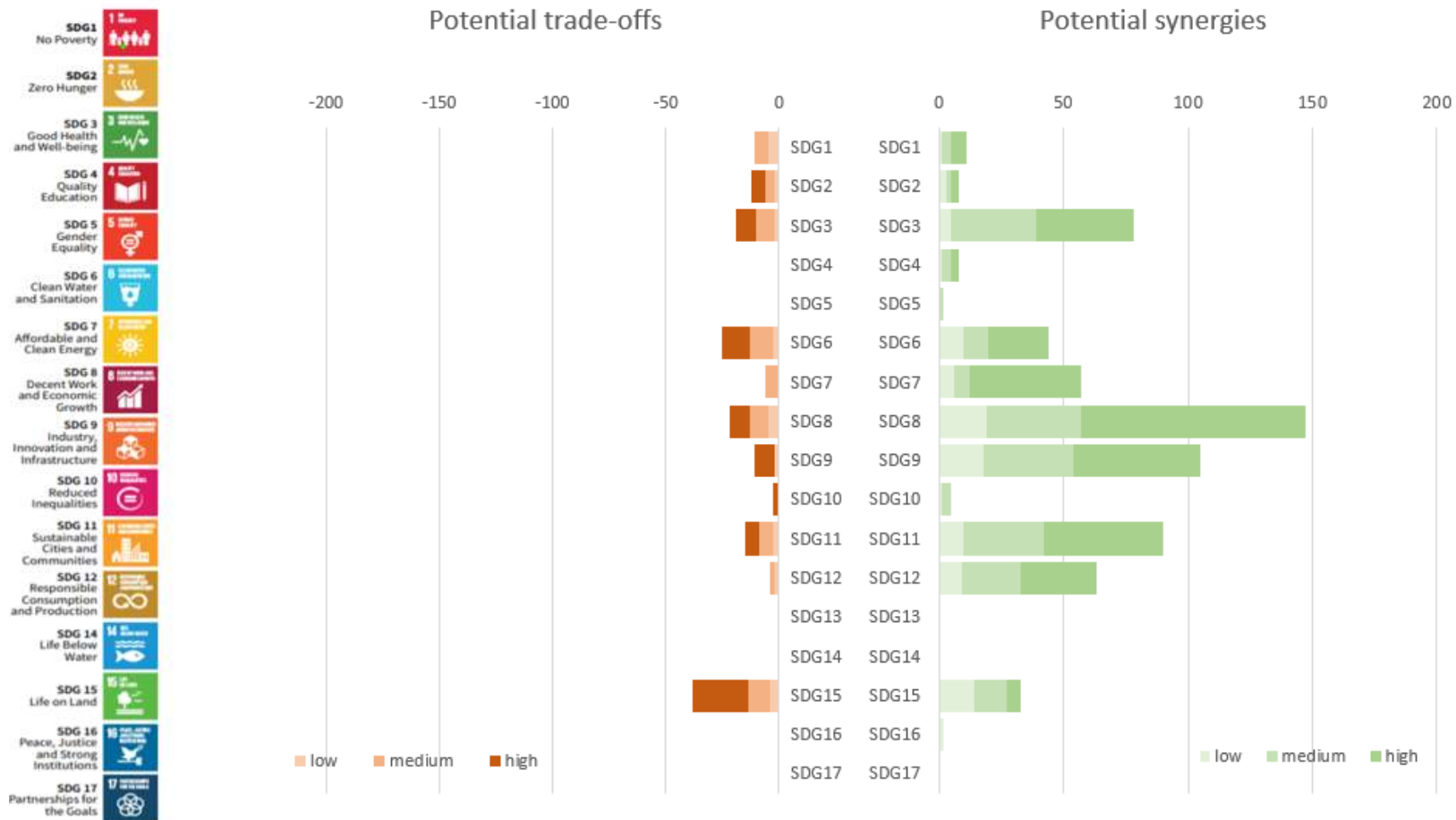






Figure 13 Electricity & heat, Transport, Buildings sectors – Synergies and Trade-offs

5 Recommendations

	<p>Weighting and scoring for the remaining five sectors:</p> <ul style="list-style-type: none"> • Industry • Waste • Agriculture • Forestry • General <p>Compilation of aggregated synergies and trade-offs of the eight mitigation sectors with the national 2030 Agenda.</p>
	<p>Dissemination of the results at national and international level in order to:</p> <ul style="list-style-type: none"> • Empower and engage national stakeholders • Raise the visibility of the benefits of climate action and its linkages with the 2030 Agenda • Share best practice example of identification and quantification of SDG-NDC nexus • Promote the Q-SCAN tool • Include the summary of the results into the enhanced NDC submission document
	<p>Going beyond expert work and involving as many as possible different stakeholders to participate in:</p> <ul style="list-style-type: none"> • Identification of relevant synergies of trade-offs • Weighting of synergies and trade-offs • Review and validation of results <p>Designing easy-to-follow procedures which will enable high level of inclusiveness and substantial buy-in from the stakeholders.</p>
	<p>Use of terminology for policies and measures recognized by the SCAN tool.</p> <p>In future mitigation analyses, it would be highly beneficial to use the terminology for policies and measures recognized by the SCAN tool. This certainly will make allocation of the national mitigation measures under the mitigation measures from the SCAN pool much easier (no need for additional adjustments). Moreover, the SCAN tool uses standard of naming the mitigation policies and measures which is followed by many international organizations (IEA, IRENA, JRC etc.), so in general, this will enable more straightforward application of any tools developed internationally in national conditions.</p>

Appendix: Q-SCAN North Macedonia (Excel file)

Excel-based data set behind the Macedonian SDGs-enhanced NDC nexus. Includes also quantifications and graphical presentations. (See the newly created sheets “Indicators” associated to each SCAN sector.