

Regional Planning and the Energy Efficiency Purposes

Case of Tehran Region in Iran

vorgelegt von

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von der Fakultät VI - Planen Bauen Umwelt
der Technischen Universität Berlin
zur Erlangung des akademischen Grades

Doktor der Ingenieurwissenschaften
- Dr.-Ing –

genehmigte Dissertation

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Tag der wissenschaftlichen Aussprache: 20. Juli 2016

Berlin 2018

Acknowledgement

I would like to appreciate all the individuals who motivated and supported me in all phases of this study. First of all, I would like to express my gratitude to my dear parents for their encouragements, supports, and especially for their patience during the long years of my studies. My special thanks go also to all of my family members for their perennial encouragements and also to my wife for her supports in preparing the work for submission.

I am grateful to my distinguished supervisor Prof. Dr. Rudolf Schäfer for his scientific precise advices throughout this study. I am also thankful to Prof. Dr. Frank Schwartz for taking part in my final presentation and for reporting this work.

With a special appreciation to Mr. Ing. Mohammad Reza Talebi and Mr. Dr. Ali Iranshahi for their valuable contributions to different phases of the work.

My sincere thanks go to Mr. Dr. Pirouz Hanachee, deputy minister for architecture and urban development in Ministry of Roads and Urban Development of Iran, for his advices and supports. I also owe many thanks to the scholars of the urban planning and architecture research center of Iran, namely Mr. Ing. Sepehri, Mrs. Ing. Nasiri, and Mr. Dr. Saeid Izadi, who provided me with scientific materials needed in data collection phases. I would also like to thank Mr. Dr. Asadi in University of Tehran as well as Mr. Ing. Mohammadian in office for national construction codes in Ministry of Roads and Urban Development of Iran for their supports in data collection phase.

Last but not the least; I would like to thank my dear friends Mr. Amir Soleymani, Mr. Ing. Mehrdad Mehran, Mr. Ing. Kian Tavakoli, Mr. Behzad Molla Norouzi, and Mr. Ing. Ahmad Nasrolahi for their helps and their great camaraderie.

Abstract

The background concepts based on which this research is carried out could be divided into four categories; first, the climate change impacts are clearly visible in urban regions throughout Iran, including Tehran Region; second, despite the national regulations set to reduce the use of fossil energies, the use of those energies are still high in different consumption types; third, the Tehran Metropolitan Region Plan as the regional plan for former Tehran Province has paid very little attention to the issues of climate protection and climate adaptation; and four, there are good capacities in governmental organizations, which could be utilized in order to insert climate adaptation strategies into the urban and regional plans.

With the exception of national-wide general approaches e.g. replacing fossil energy carriers with clean and renewable ones, altering oil-firing vehicles into gas-firing ones, regulating buildings' construction based on efficient isolating facades, etc. the issue of energy efficiency has been neglected in urban and regional development plans in Iran. It means that the actions needed against the high energy consumption rates, and its effects on climate change and air pollution have been taken into account only in case of consumption types, so the authority organizations are only obliged to act accordingly in a sectoral base. Therefore, there is a perceptible lack of integrated energy management in urban and regional plans especially in the Tehran Metropolitan Region Plan.

Moreover, the impacts of climate change on this region are also disregarded in development plans prepared for that. This is due to the lack of integrated urban and regional planning system working closely with the units responsible for the climate research and climate projections. Whereas, the existing capacities in both urban management bodies and the department of environment could be utilized to incorporate the climate adaptation strategies in urban and regional development plans in Tehran Metropolitan Region. This study highlights the existing efforts, gaps, and capacities and tries to bridge the gap in the organizational frameworks of the responsible authorities.

Zusammenfassung

Die Hintergrundkonzepte, auf deren Grundlage diese Forschung durchgeführt wurde, gliedern sich in vier Kategorien; erstens die Auswirkungen des Klimawandels in urbanen Regionen im gesamten Iran, einschließlich der Region Teheran, sind deutlich sichtbar; zweitens trotz der nationalen Regelungen, die den Einsatz fossiler Energien reduzieren sollen, sind die Nutzung dieser Energien in den verschiedenen Verbrauchstypen immer noch hoch; drittens der Teheraner Metropolregionplan als Regionalplan für die ehemalige Teheraner Provinz hat den Fragen des Klimaschutzes und der Klimaanpassung wenig Beachtung geschenkt; und viertens es gibt gute Kapazitäten in Regierungsorganisationen, die genutzt werden könnten, um Klimaanpassungsstrategien in die städtischen und regionalen Pläne einzubringen.

Mit Ausnahme von landesweiten allgemeinen Ansätzen z. B. der Ersatz fossiler Brennstoffe durch saubere und erneuerbare Energiequellen, die Umwandlung ölbefeueter Fahrzeuge in gasbefeuerte Fahrzeuge, die Regelung vom Bau neuer Gebäude auf der Grundlage von effizienten isolierenden Fassaden usw. das Thema Energieeffizienz ist in Stadt- und Regionalentwicklungsplänen im Iran vernachlässigt worden. Dies bedeutet, dass die Maßnahmen, die gegen die hohen Energieverbrauchsrate und ihre Auswirkungen auf den Klimawandel und die Luftverschmutzung erforderlich sind, nur bei den Verbrauchsarten berücksichtigt wurden, so dass die öffentlichen Organisationen nur verpflichtet sind, entsprechend auf sektoraler Basis zu handeln. Daher besteht ein offensichtlicher Mangel an integriertem Energiemanagement in Stadt- und Regionalplänen, insbesondere im Teheraner Metropolregionplan.

Darüber hinaus werden die Auswirkungen des Klimawandels auf diese Region auch in dafür vorbereiteten Entwicklungsplänen nicht berücksichtigt. Dies ist auf das Fehlen eines integrierten Stadt- und Regionalplanungssystems zurückzuführen, das eng mit den für Klimaforschung und Klimaprojektionen zuständigen Behörden zusammenarbeitet. Die bestehenden Kapazitäten sowohl in den städtischen Verwaltungsbehörden als auch im Umweltministerium könnten genutzt werden, um die Klimaanpassungsstrategien in Stadt- und Regionalentwicklungspläne in der Metropolregion Teheran einzubeziehen. Diese Studie hebt die bestehenden Bemühungen, Lücken und Kapazitäten hervor und versucht, die Lücke in den organisatorischen Rahmenbedingungen der zuständigen Behörden zu schließen.

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List of abbreviations

BBR	Bundesamt für Bauwesen und Raumordnung (Germany)
BMVBS	Bundesministerium für Verkehr, Bau und Stadtentwicklung (Germany)
CA	Climate Adaptation
CBSA	Core Based Statistical Area (America)
CC	Climate Change
CNG	Compressed Natural Gas
CM	Climate Mitigation
CP	Climate Protection
DOE	Department of Environment (Iran)
DUS	Daily Urban System
EE	Energy Efficiency
EMR	Extended Metropolitan Region
ESDP	European Spatial Development Perspective
EU	European Union
FRPA	Federal Regional Planning Act (Germany)

FSPA	Federal Spatial Planning Act (Germany)
FUR	Functional Urban Region
GAW	Global Atmosphere Watch
GDP	Gross Domestic Product
GHG	Greenhouse Gas
HCUDA	High Council of Urban Development and Architecture (Iran)
HSE	Health, Safety, and Environment
IPCC	Intergovernmental Panel on Climate Change
LPG	Liquefied Petroleum Gas
McSA	Micropolitan Statistical Area (America)
MHUD	Ministry of Housing and Urban Development (Iran)
MMD	Multi-Model Data set
MOI	Ministry of Interior (Iran)
MOP	Ministry of Petroleum (Iran)
MPO	Management and Planning Organization (Iran)
MR	Metropolitan Region
MRMO	Municipalities and Rural Management Organization
MRP	Metropolitan Region Plan
MRT	Ministry of Roads and Transportation (Iran)
MRUD	Ministry of Roads and Urban Development (Iran)
MSA	Metropolitan Statistical Area (America)
NECTA	New England City and Town Areas (America)
NIOC	National Iranian Oil Company
NLHO	National Land and Housing Organization (Iran)
NPB	National Planning Board (America)
NRC	National Resources Committee (America)
NRPP	National and Regional Physical Plans (Iran)
NTDC	New Town Development Company (Iran)
ODPM	Office of Deputy Prime Minister of England
OECD	The Organization for Economic Co-operation and Development

OMB	Office of Management and Budget (America)
PBO	Plan and Budget Organization (Iran)
PBL	Planbureau voor de Leefomgeving (Netherlands)
PDSPC	President Deputy Strategic Planning and Control (Iran)
PMCR	Polycentric Mega-City Region
PUR	Polycentric Urban Region
RPAA	Regional Planning Association of America
SELMA	Spatial Deconcentration of Economic Land Use and Quality of life in European Metropolitan Areas
SPI	Spatial Planning of Iran
SVR	Siedlungsverband Ruhrkohlenbezirk (Germany)
TMR	Tehran Metropolitan Region
TMRP	Tehran Metropolitan Region Plan
TVA	Tennessee Valley Authority
UA	Urban Agglomeration
UF	Urban Field
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
UNDESA	United Nations Department of Economic and Social Affairs
UNICEF	United Nations Children's Fund
UPARC	Urban Planning and Architecture Research Center of Iran
WMO	World Meteorological Organization

1. Introduction

The Iranian national, regional, and local development regulations and their interrelationships seem to be comprehensive and adequate at the first sight as if there should be no deficit in planning and in implementation procedures. Nevertheless, the scientists and scholars of related urban disciplines have been always mentioning that there is a lack of transparency among different levels of development plans as well as among their responsible organizations, which makes their efforts not to be fruitful though they are usually highly financed. Hypothetically, the problem could be lain in decision-making processes which are mostly top-down and organization-oriented. This means that any of the planning and implementation legal authorities makes their own decisions and acts individually though they contribute to the implementation of a development plan in particular level, where highly coordinated stakeholder participation is needed.

In other words, there is a lack of integrated urban planning and implementation system bringing all responsible legal bodies together. This makes the development plans which are usually interdisciplinary and must be implemented through participation of many stakeholders fail or not get desired goals because each stakeholder is acting according to its own regulations, for there is very little coordination among them. The present study focuses on the Tehran Metropolitan Region Plan (TMRP) as a major case study to investigate the interrelations amongst the local authorities in the region and to look for any energy efficiency and climate change considerations in such a regional plan.

This study consists of 6 chapters. Chapter 1 introduces the topic of the study and poses the research questions and hypothesis together with primary and unequipped answers to them. The methodology of the research is also introduced in this chapter.

The second chapter is dedicated to the literatures related to regional planning. In this chapter, the regional planning definitions, its contents, and its history and origins are illustrated. This chapter gives also an overview of recent and contemporary interrelated concepts pertaining to the urban regions and metropolitan areas around the world. The background history of regional planning in Iran is also reviewed and its current situation is

analyzed to make the framework for the analysis of the case study coming in the next chapters.

The third chapter discusses the phenomena of energy usage and CO₂ emissions and their impacts on the global climate as well as the change of global climate and its impacts on the world's urban regions. This chapter presents, then, the climate change impacts on urban regions in Iran and reviews the legal bases for energy efficiency and environmental protection in this country. The goal is to investigate the existence of such a legal basis and to introduce the actor organizations working on energy efficiency and climate issues in order to look for any given role to them in the case study region.

The fourth chapter deals with the TMRP as the case study. The TMRP is a regional plan supposed to be implemented in former Tehran Province. This chapter reviews the plan to grope for any initiative desiring to reduce the use of energy in the region and for any attention paid to insert climate adaptation strategies in regional development policies.

The fifth chapter introduces a good example of climate adaptive regional development in Germany. The model project Westsachsen Region focuses on climate change impacts on social and natural environments and analyses the vulnerability of various elements against those impacts in the long-term to recommend the adaptation strategies. The goal of this chapter is to create a conceptual know-how and to clarify the practical meaning of climate adaptation concept in regional plans in order to make a comparison framework between the two case studies.

Finally, the sixth chapter deals with finalizing the results of the study. The final analyses of all chapters will be reviewed here once again and the two case studies will be compared through the most important two criteria including fundamental planning differences and climate considerations. Further discussions in this chapter try to analyze the local urban management system in Iran and the centralized decision-making structure pertaining to the energy management. The results of the discussions, then, show up in terms of recognizing the capacities both in urban management system and in the Department of Environment (DOE) in Iran.

1.1. State of the problem

Iran ranks the third-largest country in oil reserves and the second-largest one in natural gas reserves in the world, and is the third-largest natural gas consumer worldwide.¹ Reviewing global energy consumption statistics highlights that Iran is one of the top energy consumers despite the fact that its population is not much more than many other countries using less amount of energy. Natural gas consumption has increased more than two times from 2.22 to 5.51 billion cubic feet in Iran between 2000 and 2012.² This could be, first, due to the weaknesses in urban-related issues both in planning and implementation phases such as urban planning and design, regional planning and policy-making, architectural design, construction engineering, construction materials, and to some socio-cultural problems e.g. lifestyle etc. and it shows the significance of the matter of energy management within the country. The second reason is the development of the natural gas supply and the extension of gas pipelines to more urban and rural areas with increasing populations. Recently, some national regulations regarding energy efficiency have been set by governmental organizations responsible for the issue of energy management. However, lack of integrated energy management policies aiming at bringing together local administrative organizations in provincial, regional, and county levels makes their policies not achieve the desired goals.

1.2. Research questions and objectives

The objectives, research questions, and a hypothesis have been summarized in table 1.1. In this table each objective has been equipped with a question or a hypothesis trying to prescribe the related data source as well as data collection instruments. There is also a rudimentary and absolutely preliminary answer to each question, which can, at the end of the study, be proved or be denied through the results of data analysis and its arguments accordingly.

¹ Adapted from the Energy Information Administration homepage at <http://www.eia.doe.gov/emeu/cabs/iran/oil.html> on 25.09.2009.

² Adapted from the Energy Information Administration homepage at <http://www.eia.gov/countries/country-data.cfm?fips=IR#ng> on 13.02.2015.

Table 1.1: objectives, summarized research questions and hypothesis, and the rudimentary answers

Objectives	Questions/Hypotheses	Type	Rudimentary answers
1. Identifying effective national regulations and codes on energy efficiency in regional development plans.	Are there any national regulations directly referring to the issue of energy efficiency in regional development plans and what are the impacts of those regulations on current regional planning model for Tehran Region?	Question	No, the national regulations do not refer directly to the issue of energy efficiency in regional development plans, but refer to the energy consumption types as a whole.
2. Identifying the urban development plans acting in regional levels in Iran.	Metropolitan Region Plan could be assumed to act as a regional plan.	Hypothesis	Metropolitan Region Plan functions like a regional plan in Iranian urban planning system.
3. Investigating the situation of energy efficiency and climate issues in metropolitan region plan in Tehran Metropolitan Region as a major case study.	How does this planning model deal with the energy efficiency and climate change impacts on the region?	Question	The TMRP pays a little attention only to the climate mitigation.
4. Looking for capacities and opportunities pertaining to the climate issues in constitutional and legal frameworks as well as in organizational facilities.	Could the policies and approaches of an international good example be localized and applied in Tehran Metropolitan Region Plan in Iran?	Question	Should be investigated.

Source: own design

The first objective looks at the national regulations and guidelines pertaining to the issue of energy and energy efficiency and is followed by the question about existence of any regulation focusing on the issue of energy efficiency in regional development plans. Reviewing related national development plans and regulations revealed that the first and the second national 5-year development plans have put emphasize on changing energy consumption patterns, reducing energy consumption, replacing fossil fuels with clean energy carriers, and improving the efficiency of energy usage. Having followed the goals of those plans, the 3rd national 5-year development plan has stressed on the energy consumption in the buildings and has called for energy efficiency codes and regulations to be set up by the responsible authorities in order to prevent the buildings from wasting energy.³ There is also a little attention paid to the issue of energy efficiency in the 4th 5-year development plan, as it tries mostly to emphasize that the old motorized vehicles should be replaced with the new ones to protect the environment.

The second objective of this research is to seek for the existence of regional development plans among all development plans in Iranian urban planning system because in such a complicated system, and as a result of using different terminologies, it is not clear whether any of the development plans act regionally. Therefore, and first of all, there is a need for recognition of any plan referring to the regional matters of development. The research has, in early stages, shown that the TMRP could be assumed as a regional plan for Tehran Province. “There are no regional planning policies or models for Tehran Region, but the only plan which proposes a coherent development scheme for Tehran Province is the Tehran Metropolitan Region Plan.”⁴ Therefore, there is a serious need for investigation into the discernment of the type of TMRP as well as for certain criteria to verify if this plan could fulfill the requirements of a regional plan. In short, the TMRP could be assumed as a regional planning approach because its contents match the contents of regional planning.⁵

³ See article 121-D in Iran’s 3rd 5-year development plan (2000-2004) for more details.

⁴ Taken from the interview with Mr. Dr. Ali Iranshahi, the vice manager of inspection and monitoring dept., Iran Municipalities and Rural Management Organization on 29.04.2012.

⁵ The contents of Regional Planning are categorized into 4 major parts known as demographic, economic, transportation, and land use characteristics. See Wang, X. and Vom Hofe, R. (2007) for more details.

The third objective, nevertheless, questions the existence of any policy, approach, or tool trying to address the issue of energy efficiency in this plan. The energy efficiency here refers to the regional development elements improving different parts of the region in terms of physical and social infrastructures creating a balanced development throughout the region, lowering the daily trips, offering low CO₂ transportation facilities, planning for sustainable land use, and maintaining the natural resources in the region. This question will also examine the existence of any climate adaptation policy in the TMRP.

As the last objective, this research is tending to learn from good European examples the methods and approaches in the field of climate adaptation strategies more or less transferable to the major case study of the research.

1.3. Methodology

The research methodology employed in this study is based on qualitative research and analysis methods. As this research work required enormous number of pages of text e.g. books, articles, plans, and reports etc. to get reviewed, and considering the issue of validity of data collected, a well-designed qualitative method was necessary to be employed. Therefore, the data collection and analysis methods employed in this study were drawn from the valuable source book of Miels, M. B. and Huberman, A. M. 1984, which has focused on the methods of qualitative data collection and on how the process of analysis can be run beside data collection as a synchronized activity.⁶ Having stressed that a designed data collection can accelerate the whole process of data collection and analysis, they put the emphasis on how the conceptual framework in a qualitative research can be drawn up after the research questions are clarified and on how the sampling criteria should be developed to result a better instrumentation phase.⁷ Through this methodology the

⁶ Miels, Matthew B., Huberman, A. Michael (1984): *Qualitative Data Analysis*; a sourcebook of new methods. 2nd Ed. Sage Publications, Beverly Hills, California.

They have described the step-by-step activities in which the data needed for a qualitative research could be gathered and analyzed at the same time to avoid data overload and to facilitate the operation of next steps according to the results of ongoing analysis.

⁷ See Miels, Matthew B., Huberman, A. Michael (1984), pp. 30-41 for more details.

present study came up with a designed procedure of data collection and analysis as well as a conceptual framework most related to the research questions. Therefore, the process of data collection was, accordingly, carried out and resulted a comprehensive data collection for further analyses.

1.3.1. Major and minor case studies

There was a need for a more efficient regional planning model, paying more attention to the climate change impacts, as a good pattern to provide the present study with the know-how and with the clues on the up-to-date climate-oriented regional planning, and to enable the author of this study to run a comparative data analysis. Therefore, besides the major case study, namely the TMRP, a minor case study was also chosen. This minor case study is the Westsachsen Regional Model in Germany. The goal is to compare the TMRP in Iran with this model in Germany to highlight the differences and to understand what are the weaknesses and deficits of the TMRP.

1.3.2. Data sources and data collection criteria

The process of data collection in international and Persian literatures related to regional planning and climate protection and adaptation was a time consuming work but those sources were, at least, available. Nevertheless, the data collection process in field study faced a very cumbersome limitation in gathering data concerning the TMRP. The TMRP as the only plan playing the role of regional-oriented development tool for Tehran Metropolitan Region was neglected after it received its ratification on 2003 and currently neither the people having worked on the plan are easily available nor the publications referring to the plan are freely accessible. Therefore, the author of this study experienced a very tough job looking for the relevant sources of information. The only official and reliable sources of information are the few publications released by the Urban Planning and Architecture Research Center (UPARC) of Iran.

The first group of data sources was the related literatures both in international and Persian contexts. Through the scope of research questions as well as a set of complementary questions in detail, the literature selection criteria were rationalized and the extraction of collected documents were done to narrow down the amount of materials and eliminate data overload. The goal was to get a deep understanding of the conceptual environment of the topic as well as its situation in the case study in Iran in order to develop a conceptual framework through which the research could reach its goals. This part was, in fact, the basis of the research work, dealing with the fundamental concepts of regional planning, which created and structured the first chapter of the dissertation.

The second source of data for this work was the official plans, reports, studies etc. and critical ideas reflected in academic and professional environments pertaining to the research topic and to the case study in Iran. Those information, however, have been subject to content analysis in the research to reveal their relevance to the research questions.

Interviewing related officials engaged in urban planning departments of local authorities was the third source of information. A question-based open-end discussion was employed for the interviews, following the main themes of research questions. The interviewees were selected from authority organizations having been working on regional-scaled urban development plans, including the TMRP, as well as their personals.

The official homepages of organizations responsible for regional planning, energy provision, energy management, and environmental affairs are also to be mentioned here. These homepages are very good and reliable sources of information pertaining to the organizational regulations.

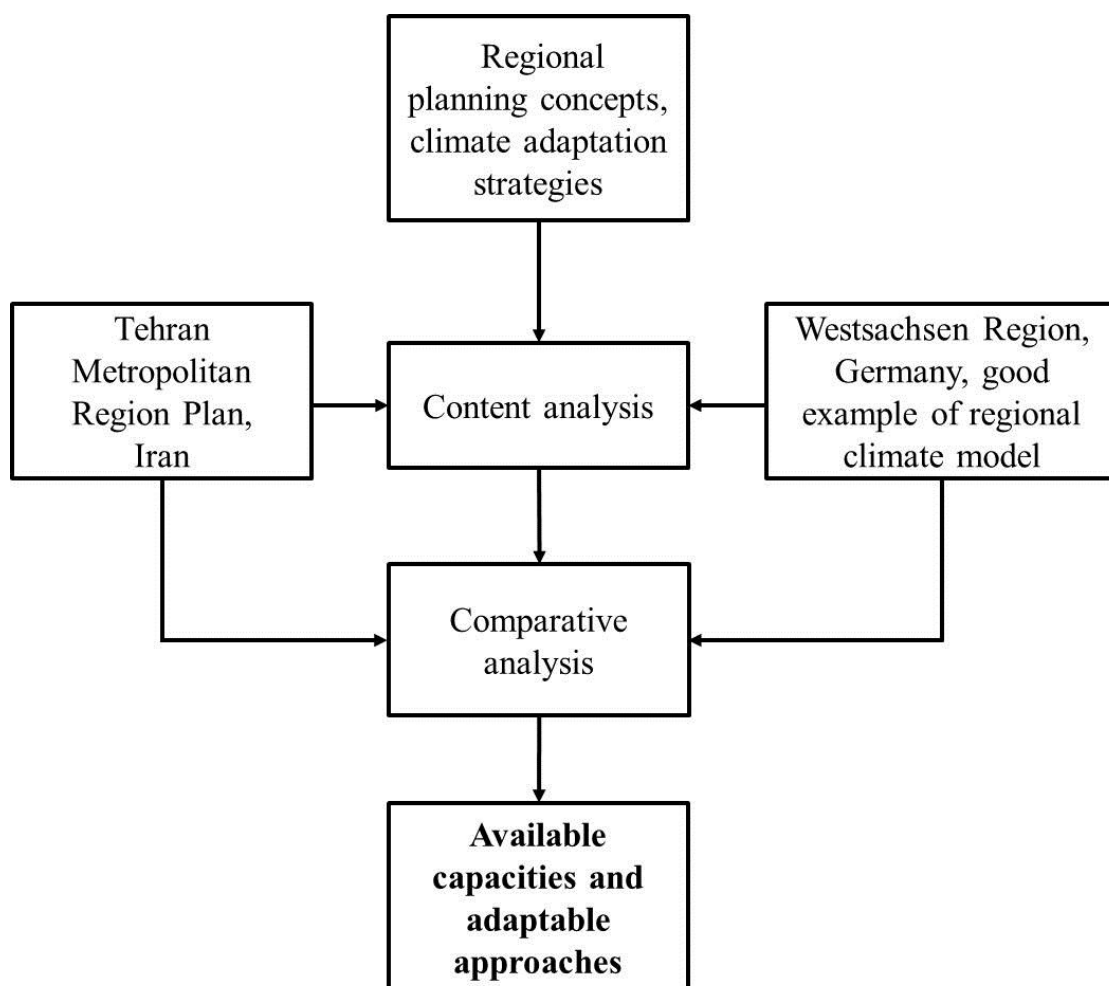
The main sources of information regarding the minor case study included the publications and reports released by the authorities of the Westsachsen Region, the online sources, and the information presented in KlimaMORO conferences.

1.3.3. Comparative data analysis approach for case studies

Considering the complexity of national and local planning guidelines and regulations in Iran and the existence of so many types of development plans, the most important objective of this research is to seek for a clear vision of regional planning approaches in Iran and the situation of energy efficiency and climate considerations in them. Among all development plans in Iranian urban planning system the TMRP was selected as major case study, as it was the sole planning instrument focusing on Tehran Region. Later, the TMRP was analyzed through content analysis methods and compared with international regional planning concepts through comparative approaches to prove if it could be assumed as a regional plan at all. On the other hand, a good example of regional planning with climate-oriented objectives was needed – as a minor case study – to have a reference model for policy adaptation. Therefore, the Westsachsen regional model project was selected after the author of this study took part in KlimaMORO conferences in Leipzig and Berlin. The data analysis approach employed here is a comparative approach to compare the contents of both planning models with the concepts of regional planning and climate adaptation as a whole and to compare the components of the two models with each other. This was done to show the deficits and weaknesses of the major case study – the TMRP – in dealing with the climate change impacts on the region.

The reason why the Westsachsen regional model was selected as a minor case study is the importance of the climate adaptation strategies taken into account for a long-term planning perspective. Moreover, the author of present study tried to choose a case which was advanced in terms of climate adaptation and was selected by the KlimaMORO and was also accessible for data collection. This model functions as an illustrative pattern here to show how a more efficient climate adaptive regional planning model looks like and what components and considerations it possesses, and the author of this study does not – by no means – claim that it is a complete and perfect regional planning model existing. Figure 1.1 highlights the conceptual framework of the comparative methodology employed in this research.

Figure 1.1: content and comparative analysis as a systematic approach



Source: own design

1.3.4. Quotations and references

The information sources used in this study include Persian, German, and English sources which have been listed in the last part of the work under *References*. The citation and quotation system employed in this study is based on the '*IM academic paper writing*' presented by Otto-Von-Guericke-University Magdeburg. The direct quotations are in quotation marks (""") followed by the footnote reference number. These quotations could be either at the beginning of a paragraph or at the middle of that and their references on the footnotes include the name of the author, year of publication, and the page number(s). In addition, if any complementary word, phrase, or sentence seemed to be necessary to add to a direct quotation by the author of this study, they were located within [] symbols. The indirect quotations, however, include only the footnote reference number at the end of the sentence or paragraph and their references on the footnotes begin with '*See*' and are followed by the name of the author, year of publication, the page number(s) and the term '*for more details*'. The subsequent quotations of the same sources listed in footnotes begin with '*See loc. cit.*' (loco citato) meaning '*at the place already cited*' (also known as '*Ibid*' in other standard academic writing systems).

The sources for tables, figures, and boxes are located under the given case and are followed by a footnote reference number in case of the need for complementary source information. The term '*adapted*' is used where the author of this study has taken the information from a given source and processed them to feed into the present section of the work. If a figure is drawn or a table is concluded by the author of this study, the terms '*own design*', '*own conclusion*', or '*self-collected information*' follow the source information. The photos were referred as '*self-captured*'.

The arrangement of Persian sources in references conform the following order:

Name of the author (year of publication): transliterated title of the source (Penglish), (English translation of the title), publisher, place of publication, ISBN.

نام خانوادگی و نام مؤلف یا گردآورنده (سال نشر): عنوان منبع. ناشر یا مجله‌ی میزبان، محل انتشار، شابک.

The online sources in references are accompanied by the links leading to the internet pages of their origin. The date of accessibility is also mentioned.

The online articles read and used in this research are divided into two categories. First, the articles archived in international journal homepages, which are freely accessible for download. Those articles have been cited accordingly and listed in the references as “*Available online*” in addition to the date accessed. Second, the articles archived in international journal homepages without free access for download but with possibility to have a glance at their preview or to read them up online. Those articles have been listed in the references as “*Reviewed online*” in addition to the date accessed.

1.3.5. Language equivalency

The Persian words and names of places presented in this work are given in phonetic transliterated form (*āvānevisi*, آوانویسی) and in some cases in *Romanized* form, meaning that the Persian word is written with Latin alphabets. An exception here is the names of the people i.e. the interviewees written based on the most accepted form of writing Persian names with Latin alphabets in order to avoid any misunderstanding. The source for the Persian transliteration is the ‘*Encyclopædia Iranica*’. The table 1.2 highlights the transliteration alphabets and symbols used.

Moreover, the English title of Iranian organizations and ministries were taken from their official websites and were not translated by the author of this study.

Table 1.2: transliteration of Persian alphabets

Consonant	Consonant	Consonant	Vowels
ء)	ر r	ف f	آ ā
ب b	ز z	ق q	ؤ u
پ p	ژ ž	ک k	ی i
ت t	س s	گ g	ـَ a
ث t̤	ش š	ل l	ـِ o
ج j	ص š	م m	ـِ e
چ č	ض ž	ن n	ا a
ح ḥ	ط ṭ	و v	و ow/aw
خ ḵ	ظ ḏ	ه h	ی ey/ay
د d	ع ʿ	ی y	
ذ ḏ	غ ġ		

Source: adapted from Encyclopædia Iranica⁸

⁸ Adapted from Encyclopædia Iranica at <http://www.iranicaonline.org/pages/guidelines> on 24.02.2015.

2. Literature Review

2.1. Introduction

The concept of regional planning has a long historical background. Human settlements including urban and rural areas locate, generally, on the context of a country, a state, or a region. They play, anyhow, the role of neighbors and have always common interests and conflicts. Generally, if a neighbor settlement is wealthier, it is also more capable of attracting and hosting investments and, therefore, exploiting the common natural resources in the state or the region. The more the prosperous settlements use the resources and become richer, the more other ones get poor and dependent on the riches. This process can continue as far as creating unbalanced development across the state or the region. Therefore and generally speaking, a kind of planning for redistribution of the resources throughout the region and among all settlements is necessary to avoid polarized and unbalanced development. This planning scheme, known as regional planning, aims at dealing with regional problems and shortages caused by various forms of activities, which can affect all settlements in the region as well as other neighbor regions in a short or long-term. These public problems in character relate to the social, economic, cultural, and environmental issues. Therefore, the term “regional planning” also refers to the issues e.g. population, economy, mobility, and environment. Regional planning attempts try to overcome the challenges of imbalanced development through controlling the current and future activities involving the population and its economy, making use of natural resources, and using transportation facilities in regional environment. The outcomes, then, would bring about more control over the development activities to decline imbalanced development through more efficient resources usage and less damage to the environment. Regional planning focuses on four major areas of development activities including demographic, economic, transportation, and land use planning. There are several methods and approaches to regional planning, based on the objectives of the plan as well as the urban development system in which those are applied. However, what really matters is the level of efficiency to which they perform.

From the beginning of the 20th century onwards and because of the growth of urban areas on an unprecedented scale along with the growth of industrial units, there were some special terms defined by the geographers and town planners, and later by different urban planning and political systems, to deal with the phenomenon of uncontrolled urban growth. Those terms such as *Conurbation*, *Urban Agglomeration*, *City-Region*, *Metropolitan Region*, *Metropolitan Area*, *Megalopolis*, *Extended Metropolitan Areas*, *Polycentric Urban Regions*, *Polycentric Mega-City Regions*, *Daily Urban System*, *Urban Field*, and *Functional Urban Regions* were considered during the 20th century as well as the first decade of the 21st century to characterize the greater urban areas in order to tackle their emerging specific socio-economic and environmental problems.

These particular scientific terminologies concern with the factors of urban size, urban activities, urban and regional accessibilities, local and suburb areas, and urban surroundings having practical relations with each other on a regional background. Showing the evolution of urban development and planning atmosphere and themes, those terms also reflect the current viewpoint of many urban and regional planning systems in the world. However, most of those special terms have been linked practically to the concept of regional planning in the last 5 decades. Regional planning concept lays also the basis for this research; so some of the most related terms mentioned above would also be shortly introduced.

2.2. Definitions and general international concepts

2.2.1. Planning

Planning, scientifically, refers to the issue of controlling ongoing activities to make them release the desired results. Planning refers to the issue of changes and of wishes to control the changes. A human society changes by the time and needs to be controlled to have better results out of those changes. The changes in a society can include cultural, economic, demographic, political, and environmental ones and the interrelationships among them. Therefore, planning could be assumed as a formal and disciplinary activity by which a society guides and controls changes in itself, through the application of scientific knowledge (Alden, J., and Morgan, R., 1974). Planning is mostly concerned with the future and focuses on the relation of goals and decisions while seeking to get comprehensiveness in policy and program.⁹ Planning is also a series of continuous actions for overcoming the future economic and social problems.¹⁰

The development of human activities could improve the whole process of changes and their results, and can provide new experiences and tools by which a progressive change cycle can be reached. “When such ‘development’ is guided by purposive human action responding to a carefully conceived strategy, then the term ‘planning’ is appropriate.”¹¹ The changes in a human society happen in various levels and in relation to its components. Certainly, the changes happening in a small village are different in scale and character than what happens in a capital city or in a country as a whole. They also vary based on the available opportunities, natural limitations, and socio-economic characteristics existing on the ground. “Planning is a scientific charting and picturing of the thing [...] which man desires and which the eternal forces will permit.”¹² Therefore, a successful planning is the

⁹ See Friedmann, J. & Alonso, W. (eds.) (1964), p. 61 for more details.

¹⁰ See Ziari, K. (2009), p. 11 for more details.

¹¹ Bromley, R. et al. (1989), Regional Development and Planning. In: Gaile G. L. & Willmott, C. J. (eds.) (1989): Geography in America, p. 351.

¹² MacKaye, B. (1928), p. 147.

one which defines a very clear objective and makes the optimum use of potentials and restrictions because “the basic achievement of planning is to make potentialities visible.”¹³

Another significant factor in planning is the evaluation of the plans made in the past for the particular project, situation, or problem. This reveals the weaknesses of the old plans and provides the planner with the new knowledge and tools, for example, what the undesired impacts of the plan were and how to deal with them in that particular situation in order to prevent them from emerging in the future plans. Based on these concepts, planning for the development of a city, urban area, or a region is a deliberate continuous scientific activity taking economic, demographic, and environmental issues into account to have the optimum outputs and to minimize the negative effects of the plan on the whole human settlement for which the plan is made.

2.2.2. Region

First of all and as to how a regional plan can be called and applied for a particular spatial and geographical environment, the term region should be defined as a precondition for assessment of its problems and characteristics. There have been several definitions offered by the scientists from different disciplines, referring to the particularities of the region e.g. its function, its territory, its administrative framework, its cultural structure, etc., of which each represents its own conditions and requires its own planning applications.

However, a region with all relevant components is always problematic for the planners to define. Region as an unclear word, not describing exactly the physical characteristics of a space to which it refers, such as largeness, location, accessibilities, etc., and not clarifying the characteristics of its components, remains basically to be defined by the purpose of its use. The largeness of a region and its population size, the physical accessibility and economic networks within it, its connections with the adjacent regions, its cultural diversity, and its geographic and climatic characteristics are taken into account by different

¹³ MacKaye, B. (1928), p. 147.

groups of scientists working on related topics. “For most planners and regional scientists today, the region represents merely a taxonomic category, a functional subunit of national space.”¹⁴ Based on this definition a region can be seen as a division unit within national administrative structure which politically eases dealing with the whole country’s affairs. In defining and characterizing a region in order to plan for its development, however, it is also necessary to note its capacities and functions. Generalizing, “a region may be identified as a unit of geographical and socio-economic boundaries having a political and administrative identity.”¹⁵ Therefore, if the region is assumed as part of the national spatial structure or unit in which many spatial activities are considered, the functional aspect of that region should also be taken into account. A region, however, consists of geographical location, climatic characteristics, natural biodiversity, and cultural environment as well. Considering all these factors in a region, Lewis Mumford in his prestigious book *The Culture of Cities* has noted that a region consists of, first, natural and geographical elements like air, water, and place, and second, factors created by the humans like economy and politics, and he refers a region to the term *life-conditioned environment* (Mumford, 1938: 304). He also considers a region as a unit which could be seen from two viewpoints; man-made habitation area with its functions, and climatic and physical interactions.¹⁶ However, the characteristics of a region reflect its identity which differ a region from those of the others. But whatever the components and characteristics of a region could be, Mumford believes that there are some special qualities remaining the same in any region. He puts the emphasis on three aspects which are first, the specific geographic characters of the region, including soil, climate, vegetation and technical exploitation; second, the balance between different parts of a region in which if a part changes, the other parts should also receive compensating alterations; and third, of a natural regions, they have no marked physical boundaries.¹⁷ The natural balance in a region is of special importance, as the current generation is confronting with, for example, climate change and its consequences, which is the result of alterations in climatic conditions, made by the man and his activities.

¹⁴ Friedmann, J. & Weaver, C. (1979), p. 31.

¹⁵ Kalantari, Kh. (2001), p. 27.

¹⁶ See Mumford, L. (1938), p. 310 for more details.

¹⁷ See loc. cit., pp. 312-315 for more details.

Therefore, comprehensively and “rationally defined, the locus of human communities is the region. The region is the unit-area formed by common aboriginal conditions of geologic structure, soil, surface relief, drainage, climate, vegetation and animal life: reformed and partly re-defined through the settlement of man, the domestication and acclimatization of new species, the nucleation of communities in villages and cities, the re-working of the landscape, and the control over land, power, climate, and movement provided by the state of technics.”¹⁸

As to how a region might be identified and of what it exactly comprises, there are lots of criteria based on required purposes and actions. Nevertheless, clustering two or more urban areas having the same characteristics and/or problems is the basic idea of defining a spatial geographic unit as a region. “A region may be defined which embraces two homogeneous regions in order to solve their distinctive problems through complementary action.”¹⁹ Although homogeneity can bring out the potentials for bilateral actions, but the differences between two urban areas may also produce opportunities of better planning in the same region. “A region may be defined which embraces two markedly separate polarized nodes in order to fulfill their potential.”²⁰ Conceptually, embracing two or more urban nodes means to unify their separate identities and to bring them together as a region to share their problems and resources – no matter of their individual official boundaries.

2.2.3. Regional Planning

Based on the given image above for a region and from the urban and regional development viewpoint, a region includes rural and urban settlements which are connected to each other through a network of roads, which are dependent on each other through the flow of goods and products, which have population and human power exchange, which have the same regional climate, and which, finally, share local and traditional sense of life. Regional planning, then, means to conserve this collective characteristics and forms of lives

¹⁸ Mumford, L. (1938), p. 367.

¹⁹ Alden, J., & Morgan, R. (1974), p. 3.

²⁰ See loc. cit.

throughout the region through an equal development of each part while conserving also the environment as well as natural resources. Regional planning can be defined “as a particular type of structural solution to the problem of societal self articulation. In other words, in order to overcome the problems it is experiencing or to realize the goals it has set for itself, society or groups within society may institutionalize the planning of supra urban spaces [regions].”²¹ Therefore, regional planning could also be defined as “the process of formulating and clarifying social objectives in the ordering of activities in supra-urban space.”²²

Benton Mackaye (1928) has illustrated the regional planning in general as an attempt to visualize the coordinated actions within a region, which aim at achieving general human living purposes.²³ Those coordinated actions within a region could be assumed as all actions necessary to develop all parts of a region including cities, villages, agricultural lands, forests, etc., to prevent them from gradual abandonment while their population could migrate to larger urban centers for getting better life conditions. “Regional planning is the conscious direction and collective integration of all those activities which rest upon the use of the earth as site, as resource, as structure, as theater. To the extent that such activities are focused within definite regions, consciously delimited and utilized, the opportunities for effective co-ordination are increased. Hence regional planning is a further stage in the more specialized or isolated processes of agriculture planning, industry planning, or city planning.”²⁴

2.2.3.1. Goals and objectives

Regional planning aims mostly at equally distributing the development actions to all local settlements in the region. It aims at improving life conditions for inhabitants of every settlement to prevent the imbalanced development. It imposes the control on metropolitan

²¹ Alden, J. & Morgan, R. (1974), p. 2.

²² Friedmann, J. & Weaver, C. (1979), p. 119.

²³ See MacKaye, B. (1928), p. 153 for more details.

²⁴ Mumford, L. (1938), p. 374.

development as well as centralization of the economic and social opportunities. “It does not aim at urbanizing automatically the whole available countryside; it aims equally at ruralizing the stony wastes of our cities.”²⁵ Therefore, “regional planning asks not how wide an area can be brought under the aegis of the metropolis, but how the population and civic facilities can be distributed so as to promote and stimulate a vivid, creative life throughout a whole region.”²⁶ According to Mumford (in Sussman ed. 1976), regional planning has two important characteristics; first, it includes cities, villages, and permanent rural areas, considered as part of the regional complex, and second, it considers balanced environment and a settled mode of life.²⁷

A very common and important aspect of regional planning, referred by most of the regional planning thinkers, is the climatic and natural environment of the region, which should be taken into account when planning for the region. If this aspect is good conserved, it can provide future generations of human beings with natural resources as well. With this conceptual background and in highlighting the meaning of regional planning, we have to note that whatever the planning efforts offer to a region, the natural environment of the region should be conserved because “the ability to provide for current and future human well-being depends on protecting natural capital from systematic overuse; otherwise, nature will no longer be able to secure society with these basic services.”²⁸ This should be done through replacing the balance naturally existing in a region by a richer environment, and a sort of carefully balanced intellectual human activities on a high cultural basis.²⁹ On the other hand the action of planning in a natural environment should be aware that it is not possible to plan for the nature before having obeyed what the nature imposes.³⁰

Calling the three major aspects of geographic, economic, and political as “cardinal” to any plan, Stuart Chase in his contribution to the book *Planning the Fourth Migration* (Carl

²⁵ See Mumford, L. (1976), Regions – To Live In. In: Sussman, C. (ed.) (1976): Planning the Fourth Migration: the neglected vision of the regional planning association of America, p. 90 for more details.

²⁶ See loc. cit. p. 90 for more details.

²⁷ See Mumford, L. (1976), Regional Planning. In: Sussman, C. (ed.) (1976): Planning the Fourth Migration: the neglected vision of the regional planning association of America, pp. 203-204 for more details.

²⁸ Munier, N. (ed.) (2006), p. 2.

²⁹ See Mumford, L. (1938), p. 314 for more details.

³⁰ See MacKaye, B. (1928), pp. 146-149 for more details.

Sussman, ed. 1976) also points out that the economic region, which means an area unit with its naturally existing soil, climate, topography, and racial mixture, is the best unit for planning. The issue of natural regional balance also reminds that a region itself as part of a country, and of the earth as a whole, is also a part of wider regional balance. Therefore, regional planning should conduct the development of the region in a way that considers its relations with other regions as well.

Regarding the preparation and the implementation of a regional plan and focusing on step-by-step and participatory character of regional planning, Mumford divides the regional planning into 4 stages including survey, drafting the social needs and goals, imaginative reconstruction and projection, and participatory implementation by the political and economic agencies after getting the community's acceptance.³¹

2.2.4. Recent and contemporary interrelated concepts

In this section, the most related and important concepts pertaining to the term region are presented. Following concepts refer to the fundamental and conceptual bases and criteria according to which a region is classified. These concepts illuminate the characteristics of particular urban regions to give an overview of what the regions need to be planned in the future. In other words, the regions with different names here are seen as planning units and not necessarily as implementation bodies, though many institutions for applying the plans could be established in any of those planning units. Table 2.1 gives an overview of those concepts with their important characteristics and each concept is defined and discussed in upcoming pages.

³¹ See Mumford, L. (1938), pp. 376-380 for more details.

Table 2.1: overview of the concepts discussed in this section regarding the term ‘region’

Related concept	Key characteristics
Conurbation	Industrial development, transformation of countryside, connection of neighbor factory towns.
City-region	Larger city with its surrounding urban and rural areas under the same political influence, expansion of a major city to embrace other smaller towns.
Megalopolis	Economic activities and power, rapid urbanization.
Daily urban system	Central city with commuting work power from the surrounding rural areas.
Urban field	Powerful core regions with weak peripheries, need for decentralization of economic activities.
Polycentric urban regions	Collection of two or more urban nodes enforced by the need for services, globalization, and economic dependence.
Polycentric mega-city regions	Physically separate and functionally networked mega-city regions, global economy and information transfer played a key role creating these regions.
Urban agglomeration	The population size of a whole urbanized area regardless of administrative boundaries of local urban centers, several towns with their suburbs.
Extended metropolitan regions	Urban cores with adjacent large and medium-sized cities, economic growth and demographic changes, environmental problems.
Functional urban regions	Defining regions based on their function not only in the region but also in interregional levels, the population, employment rates, and commuting rates are key issues.

Metropolitan region	Balanced development of suburbs around the core metropolitan cities as well as the coherent development of the metropolitan region, economic and environmental aspects are significant, core population size of at least one million, commuting rate of at least 10%, metro population of more than 1.5 million inhabitants.
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Source: own conclusions from the sections 2.2.4.1. to 2.2.4.11.

2.2.4.1. Conurbation

This term was first introduced by Patrick Geddes in his book *Cities in Evolution* in 1915. His idea concerned the new technologies of the time and their influence on the industrial development speeding up the growth of the urban areas. He believed that the rapid growth of larger urban areas swallowing their surrounding countryside brings about, actually, a transformation, not an appropriate development. He recommends, then, the term *Conurbation* meaning the connection of neighbor factory towns through their expansion in particular directions. In this definition, the rural areas around the urban centers connected are not included.³²

³² See Geddes, P. (1915), pp. 25-36 for more details.

2.2.4.2. City-region

City-regions have been being considered in many countries from the mid-20th century onwards. City-region refers to a “city or conurbation plus its sphere of influence”³³ and includes not only the core city but also all its surrounding urban and rural areas under the socio-economic and political influence of the core city. “We have defined ‘city-region’ to refer to: a strategic and political level of administration and policy making, extending beyond the administrative boundaries of single urban local government authorities to include urban and/or semi-urban hinterlands.”³⁴ A city-region could also result from “an urban development on a massive scale: a major city that expands beyond administrative boundaries to engulf small cities, towns and semi-urban and rural hinterlands, sometimes expanding sufficiently to merge with other cities, forming large conurbations that eventually become city-regions.”³⁵ The Cape Town city-region in South Africa with nearly 100 kilometer extension and the Bangkok city-region expected to expand another 200 kilometer by 2020 are examples of such large city-regions (UNICEF, 2012).

2.2.4.3. Megalopolis

The term Megalopolis was first used by Oswald Spengler in his book *Der Untergang des Abendlandes*³⁶ in 1918. In this book, he mostly speaks of world’s history, human beings and their culture, and of the ancient cities and megalopolises powered and controlled by economies or blood races. Twenty years later, Lewis Mumford recalls the term in his prestigious book *The Culture of Cities* in 1938. The main ideas he points out are related to the history of the formation of human settlements beginning with Eopolis (rise of the village community) and ending with Nekropolis (the city of the dead). He completes, actually, the picture after his precedents like Oswald Spengler and Patrick Geddes. He refers to the megalopolis as a mass of power, economic activities, and dominant producers

³³ Hall, P. (2002), p. 116.

³⁴ Tewdwr-Jones, M. & McNeill, D. (2000), p. 131, In: *European Urban and Regional Studies* 2000, 7: 119.

³⁵ UNICEF (2012): *The State of the World’s Children 2012: Children in an increasingly urban world*.

³⁶ This book was translated by Charles Francis Atkinson with the title of *The Decline of the West* in 1926.

thinking only of their benefits.³⁷ He looks at the megalopolis as “the beginning of the decline.”³⁸ However and from more technical and morphological point of view, this term was first used by Jean Gottmann in 1957 in his article *Megalopolis or the urbanization of the Northeastern seaboard* in *Economic Geography* and then deeply introduced in 1961 in his book *Megalopolis* to describe the rapid and vast urbanization of the Northeastern seaboard of the United States. He describes this megalopolis as “continuous stretch of urban and suburban areas from southern New Hampshire to northern Virginia and from the Atlantic shore to the Appalachian foothills.”³⁹ He believes that such a region, which has been developed in a long process of socio-economic growth and has challenged the classic differentiations between city and country, needs a new name able to describe the region’s current powerful political, economic, and cultural stance, so the term *megalopolis* is appropriate.⁴⁰ He reviews, then, the existing problems in the megalopolis and calls for special treatments and revision of the old concepts of urban and regional development caused, mostly, by the economic and demographic factors.

2.2.4.4. Daily urban system

The term Daily Urban System (DUS) was first used by the Greek architect and urban planner Constantinos A. Doxiadis in the 1970s, who founded the field of human settlement sciences. The DUS represents an expanded urban area including a central city and its surrounding rural areas whose population commute to the central city for work (Bretagnolle et al, 2001). Therefore, two major concepts have to be identified to define a DUS, which are the core city as the employment center and the commuting hinterlands or rings to be allocated to each center.⁴¹

³⁷ See Mumford, L. (1938), pp. 284-292 for more details.

³⁸ See loc. cit., p. 289.

³⁹ Gottmann, J. (1961), p. 3.

⁴⁰ See loc. cit., pp. 3-4 for more details.

⁴¹ See Coombes, M. G. et al (1979), p. 565, In: *Environment and Planning A*, 1979, volume 11, pages 565-574 for more details.

2.2.4.5. Urban field

The Urban Field (UF) concept was first introduced by John Friedmann and John Miller in the mid of 1960s to address the weaknesses of American spatial structure of urban life of the time. They criticized the metropolitan region conception comprising of metropolitan core region and intermetropolitan peripheries, and stressed that the core regions have gained high levels of economic and cultural development and left the peripheries economically, demographically, socially, and politically decaying (Friedmann & Miller 1965). They believe that the concentration of economic activities and population in metropolitan cores has absorbed the productive population and investment capitals of the periphery.⁴² The most significant part of the UF concept, thus, is the decentralization of economic activities, which gives the periphery areas the chance to regain their capabilities in terms of socio-economic strengths. Therefore, the UF can be defined as “an enlargement of the space for urban living that extends far beyond the boundaries of existing metropolitan areas – defined primarily in terms of commuting to a central city of ‘metropolitan’ size – into the open landscape of the periphery.”⁴³ In this way, the UF can also be viewed as the extension of functional metropolitan influence with less dominance because once the economic activities are decentralized to the peripheral cities within the field, the proximity factor plays a key role for better interactions, and the whole urban field remains a coherent region.⁴⁴ In other words, the UF can be defined as the sphere of influence of the urban center because there is an urban field in the hinterlands for any particular function of the urban center (Martin, 2000).

⁴² See Friedmann, J. & Miller, J. (1965), p. 313, In: *Journal of the American Institute of Planners*, 31:4, 312-320, for more details.

⁴³ See loc. cit., p. 313.

⁴⁴ See loc. cit., pp. 314-315 for more details.

2.2.4.6. Polycentric urban regions

Polycentric urban region (PUR), which is considered as a spatial planning concept, is a collection of separate urban nodes having economic interchanges among them. The changes of urban functions of early 1990s made the concept and implications of urban monocentricity out of date. Globalization, economic dependence on advanced services, informationalization, and decentralizing employment into multiple centers have paved the road to welcome new emerging urban forms; polycentric cities (Hall, 1997: 316-319). “The monocentric model [...] is apparently no longer suitable for exploring the evolving spatial patterns in urban North America, Europe and Japan. Even adaption of the standard monocentric model will not do anymore.”⁴⁵ Dieleman and Faludi (1998) believe that PURs are mostly located in Netherlands, Belgium, and Germany, and include small and intermediate-sized cities with a high population density, which are close to each other and have a high rate of daily commuters. These characteristics make the whole region as a single functional unit called polynucleated metropolitan region. “A PUR can be defined as a region having two or more separate cities, with no one centre dominant, in reasonable proximity and well-connected.”⁴⁶ According to Bailey and Turok (2001), this concept has been developed, in north-west of Europe, in highly urbanized urban regions lacking such world city urban centers.

2.2.4.7. Polycentric mega-city regions

The term Polycentric Mega-City Region (PMCR) refers to the mega-city regions comprising of some administratively independent but functionally dependent bigger and smaller cities. The PMCR refers to the originally identified mega-city regions in Eastern Asian countries e.g. China, Japan, and Indonesia (Hall 2004, Hall 1999). As a new form of early 21st century urbanization forms, a PMCR embraces “a series of anything between twenty and fifty cities and towns, physically separate but functionally networked, clustered

⁴⁵ Kloosterman, R. C. & Musterd, S. (2001), pp. 624-625, In: *Urban Studies*, Vol. 38, No. 4, 623-633. 2001.

⁴⁶ Bailey, N. & Turok, I. (2001), p. 698, In: *Urban Studies*, Vol. 38, No. 4, 697-715. 2001.

around one or more larger central cities, and drawing enormous economic strength from a new functional division of labour.”⁴⁷ This new form of urbanization has emerged due to the new forms of world-wide trade, information transfer, and transportation means. While the global economy changes and grows, cities compete to improve their economic role and function, and spread to act as linked centers of workforce and information flows (Hall, 1997). The most common feature of these regions is that they are all polycentric, but in different degrees (Hall, 2004).

2.2.4.8. Urban agglomeration

The term Urban Agglomeration (UA) deals, mostly, with the population size of the urban areas and is usually defined based on population thresholds of the cities and their suburbs. This classification of urban areas varies highly from one country to the other, so it is difficult to give a clear overview of its classification criteria. However, this term has been defined and is being used by the United Nations (UN). Based on the UN definitions, an urban agglomeration “refers to the de facto population contained within the contours of a contiguous territory inhabited at urban density levels without regard to administrative boundaries. It usually incorporates the population in a city or town plus that in the sub-urban areas lying outside of but being adjacent to the city boundaries.”⁴⁸ The UN Children’s Fund (UNICEF) defines the UA as “the population of a built-up or densely populated area containing the city proper, suburbs and continuously settled commuter areas or adjoining territory inhabited at urban levels of residential density.”⁴⁹ Based on these definitions, an UA could be also assumed as a region when planning for though the main characteristics of that are related to the population density not to the largeness of the urban agglomeration. However, an UA could include several towns and cities with their suburbs and could be smaller or larger than a metropolitan area (UN-Habitat 2009).

⁴⁷ Hall, P. (2004), p. 1.

⁴⁸ UNDESA (2011), World Urbanization Prospects, the 2011 Revision.

⁴⁹ UNICEF (2012): The State of the World’s Children 2012: Children in an increasingly urban world.

2.2.4.9. Extended metropolitan regions

The term Extended Metropolitan Region (EMR) was coined by McGee and his colleagues (1991) while studying the metropolitan regions in Asian countries. Their major idea was about the settlement transition and the transformation of space economy as well as the role metropolitan cores and *desacota* process play. They argued that the existence of the highly agricultural regions (*desacota*) adjacent to large urban cores are the instigators changing the patterns of space economy in the region and making a new form of mega-urban region to emerge. The emerging mega-urban regions would, then, often comprise of two major city cores linked by an appropriate transportation route (McGee 1991). “These regions include the major cities, peri-urban zones, and an extensive zone of mixed rural-urban land use along such routes.”⁵⁰ The box 2.1. highlights the most important characteristics of those EMRs.

Box 2.1: the major characteristics of EMRs in Asia

- The EMRs include both urban core(s) and surrounding areas, which embrace large- and medium-sized urban centers,
- The EMRs are the major focus of economic growth in their countries,
- The transportation plays a significant role in the emergence of the EMRs,
- The changes in demographic levels and household sizes as well as in household incomes are high, and
- These EMRs have normally large number of environmental problems and mixed land use challenging the policy-makers.

Source: adapted from McGee, T. (1994), pp. 83-84

⁵⁰ McGee, T. G. (1991), p. 7. In: Ginsburg, N. et al (eds.) (1991): The Extended Metropolis: Settlement Transition in Asia.

2.2.4.10. Functional urban regions

The term Functional Urban Region (FUR) is relatively a new concept in regional and metropolitan planning debates. It has been being considered in spatial planning system in Europe during the last decade. Following the unification of the European countries, and their spatial planning policies, the focus on the FUR concept aimed at seeking more adaptive and inclusive definition and criteria by which the member countries could demarcate and analyze their mega-city regions. The FUR concept enables the demarcation of the regions not based on the administrative and physical units, but as they function both at inner regional and interregional levels. A FUR refers to “a functionally-defined urban region that reaches out beyond the physically-built-up area to encompass all the areas that have regular daily relationships with a core city.”⁵¹ In other words, a FUR includes not only the core city and its peripheries but also the whole surrounding commuting areas exchanging population and economic activities with the core on a daily base. According to Hall (2004), a FUR is characterized by the employment rate of 7 percent or more per Hectare in the core city and at least 20,000 employees either in the core or in contiguous urban units and by the economic influence on ring areas where 10 percent or more of the population commute daily to the core for work. Therefore and based on these definitions, the important factors, being considered when analyzing a FUR, are the population, employment, and commuting. RheinRuhr, Randstad, Paris, and London are some examples of FURs (Knapp & Schmitt, 2003: 11).

2.2.4.11. Metropolitan region

The term Metropolitan Region (MR) is as old as decades, and has been considered from the 1920s onwards. The metropolitan development and metropolitan planning concepts were on top of the discussions during the 1930s, as to the patterns of metropolitan growth, pertaining to the physical expansion of the metropolitan area, and they had some advocates like the Chicago school of urban ecology. However, the most important aspects of the

⁵¹ Hall, P. (2004), p. 3.

metropolitan planning at the beginning of the 21st century are related to the integrated and balanced development of the suburban areas around the core metropolitan cities, and the coherent development of the metropolitan region. The new trends focus mostly on the economic and environmental aspects of the MR as the result of regional human interactions and also support “the restoration of existing urban centers and towns within coherent metropolitan regions, the reconfiguration of sprawling suburbs into communities of real neighborhoods and diverse districts, [and] the conservation of natural environments.”⁵²

There are plenty of definitions for MR, released by different individuals and organizations, but this is also generally accepted that there cannot be a single and general definition referring to the MRs across the globe. “Many countries have developed their own definition, [and] the scope of what can be learned from their international comparison is limited by the lack of an agreed definition of Metropolitan Regions across countries.”⁵³ But the most related definitions focusing on physical and morphological aspects could, however, be considered. The UN-Habitat defines the MR as a collection of local governments considered under an umbrella of larger urban area and its surrounding commuter areas as a whole.⁵⁴ Giving the Greater London and Metro Manila as examples of MR, the UNICEF stresses that a MR could also be a formal local government including the central core city with all its peripheral commuter areas, which is formed around the urban core with a population of at least 100,000 people (UNICEF, 2012). “In addition to the city proper, a metropolitan area includes both the surrounding territory with urban levels of residential density and some additional lower-density areas that are adjacent to and linked to the city.”⁵⁵ Therefore, “the definition of metropolitan areas in use in different countries consists of a core area with significant concentration of employment or population and a surrounding area densely populated and closely tied with the core.”⁵⁶

⁵² Congress for the New Urbanism (2001), p. 1.

⁵³ OECD (2007), p. 1.

⁵⁴ See UN-Habitat (2009), p. 5 for more details.

⁵⁵ UNICEF (2012): The State of the World’s Children 2012: Children in an increasingly urban world.

⁵⁶ OECD (2007), pp. 1-2.

The MRs, therefore, could be assumed as points of concentration within their national spatial divisions. The MRs are urban agglomerations hosting population, industries, institutions, and businesses and are the formative element of the morphological spatial structure (BBSR, 2011).

Apart from the largeness and demographic character of the MRs, their functionality is also considered when defining them. Especially in the context of globalization, when the MRs contribute to a global network of different worldwide goods production chains, goods distribution facilities, and socio-cultural and economic activities at various levels of interaction even on a daily basis, the MRs get the major role of pulsating hearts of the whole network. Hence, “metropolitan regions form hubs within these networks and are of central importance within these international relationships. Within these areas and regions, local and regional interact with supraregional and global functions increasing their importance.”⁵⁷

As mentioned above, there are a variety of definitions for MR based on the physical characteristics e.g. largeness, economic factors and functionality, administrative classifications, commuting rates, and demographic changes. There have also been attempts, by some international organizations, to compare the definitions and to define fixed criteria for the definition and recognition of the MRs, which enables the MRs to be more comparable. The OECD⁵⁸ suggests the following criteria for the classification and recognition of MRs:

⁵⁷ BBSR (2011), p. 7.

⁵⁸ OECD (The Organization for Economic Co-operation and Development)

Box 2.2: criteria for the recognition of a MR, set by the OECD

- Population density: the region is classified as Predominantly Urban according to the OECD regional Typology (i.e.: less than 15% of the population lives in communities -territorial units smaller than TL3 regions- with a density below 150 inhabitants per square km)
- Core population size: Selects only Predominantly Urban regions of at least one million inhabitants.
- Commuting: Commuters should account for at least 10% of the resident labour force in the selected Predominantly Urban regions with more than one million inhabitants. The Commuting rate is calculated computing the ratio between employment at the place of work and employment at the place of residence. Thus, if the commuting rate of the core region identified in the previous steps is below the fixed 1.10 threshold (i.e.: commuters accounts for less than 10% of the resident labour force), the region is considered to be self-contained and to delimit an integrated economic space, while if the commuting rate is above 1.10, then the region has significant labour force exchanges with other regions. In the latter case, neighbouring regions are added to the core and the commuting rate is re-computed for this larger region. The aggregation of neighbouring regions will continue until the threshold of self-containment is achieved (1.10).
- Metro population size: The final step is to compute the total population of the region defined following the methodology in the first three criteria. If the total population is above 1,500,000 inhabitants, the region is then considered a Metropolitan region.

Source: adapted from OECD (2007), p. 2

Based on these criteria, the OECD recognizes the MRs across the globe though not all of the criteria are applicable for some specific MRs. For example, the minimum number of inhabitants taken into account for some German MRs e.g. Frankfurt am Main Kreisfreie Stadt, Düsseldorf Kreisfreie Stadt, Bonn Kreisfreie Stadt, Köln Kreisfreie Stadt as well as for Leeds in United Kingdom is exceptionally less than 1,000,000. Other exceptions are

MRs in Canada, Mexico, and the United States, which include metropolitan statistical areas defined by statistical authorities in each country.⁵⁹

The recent trends in defining and classifying the MRs highlights the need for updated forms and approaches of regional planning. The new form of regional planning used contemporarily in most of the countries is summarized in the concept of metropolitan region or metropolitan area. The contemporary meaning of metropolitan region also focuses on the more polycentric development of the urbanized regions in terms of enabling them to enter the global economic development chain. There are lots of examples worldwide, e.g. in Europe, showing the policy outcomes of these trends. The previous spatial development of the regions in EU was concerned with the development of physical infrastructure between core areas and the peripheries, but there is a need for creating several zones integrated into the global economy (European Communities, 1999: 20). Therefore and if the final goal of regional and spatial planning is to have a balanced development of urban core areas as well as their hinterlands, the new policies should aim at integrating the core areas of MRs into the global economy to prevent the more vulnerable hinterlands from the economic exclusion. Based on this policy, the city-ranking approach in each metropolitan region should be the goal and the economic competition among cities and the sociocultural activity exchange among them should be encouraged in order to get a good complementary functional diversity throughout the MRs (European Communities, 1999: 21).

⁵⁹ See OECD (2007), pp. 3-6 for more details.

2.2.5. Regional planning; countries of origin

The evolution of urban and regional planning varies among the countries having been experiencing it. The origins of regional planning thoughts go back to France, the United Kingdom, and Germany in Europe, and to the United States continuously having societal problems in late 19th and early 20th century. “The societal problems which have initiated regional planning can be identified as social, economic, political, administrative, physical and cultural.”⁶⁰ The industrial revolution between the 18th and 19th century, the high rates of unemployment and uncontrolled urban expansions at the beginning of 20th century, the economic depression of early 20th century, and the reactions of planning associations to these phenomena played a very important role in initial phases of the regional planning evolution. In this section, the regional planning initiatives, in three major countries including the United Kingdom, the United States, and Germany, are going to be introduced in the form of reviewing their historical backgrounds.

2.2.5.1. The United Kingdom

In the United Kingdom, the concept of regional thinking and regional planning was developed as a response to the socio-economic problems started, historically, at the end of eighteenth century by the industrial revolution and changed in character by the time (Hall, 2002). The first attempt and example of British regional planning is the Doncaster Regional Planning Scheme 1922, in which the more appropriate strategy, which realized to be effective, was to concentrate on a ring of satellite towns through developing the existing villages with their nucleus centers, rather than emphasizing on Doncaster to host the whole growth of the region.⁶¹ The two decades of 1920s and 1930s were the time to action because the mentioned problems existed not only in Doncaster Region but also in many parts of Britain. High rate of unemployment in different parts of Britain in 1920s and 1930s along with a strong decline in industrial activities led to a sort of actions by national

⁶⁰ Alden, J., and Morgan, R. (1974), p. 9.

⁶¹ See loc. cit., p. 14 for more details.

government having tried to fight the unemployment. This happened in 1934 with Special Areas Act set by the government to solve the unemployment problem and to influence the distribution of economic activities spatially.⁶²

The two decades of 1930s and 1940s were the very important periods during which the regional problems were more officially investigated and reported by the governmental commissioners. Those reports include *Barlow report of 1940*, *Scott and Uthwatt report of 1942*, *Abercrombie and Reith report of 1945*, and *Dower and Hobhouse report of 1947* based on which the main legal framework for regional planning was set.⁶³ The legislations e.g. *the Distribution of Industry Act of 1945*, *the New Towns Act of 1946*, *the Town Development Act of 1952*, *the Town and Country Planning Act of 1947*, and *the National Parks and Access to the Countryside Act of 1949* were the direct outcomes of the reports provided by the commissions.⁶⁴

But the most significant regional studies leading to the actual regional development projects were two studies carried out in 1960s, as the earlier attempts had concentrated on the economic growth on the developing areas. These two studies aimed at controlling the rapid growth around the larger urban centers. The first study was the *South East Study* carried out in 1964 and suggested the building up a second ring of new towns for London at greater distance than the first ring, and the second study was the *West Midlands and the North West* regional studies carried out in 1965 and stressed on the necessity of building up new towns in each region having received no new town before 1961 in order to accommodate the population overflow of the conurbations.⁶⁵

In the recent decades, the regional planning system in Britain has been based on the concept of city-regions, which deals mostly with labor market areas. The Spatial Deconcentration of Economic Land Use and Quality of life in European Metropolitan Areas (SELMA, 2006) declares that there is no official definition for the city or for city-regions. However, it mentions that the planning units, considered as city-regions, consist of

⁶² See loc. cit., pp. 16-17 for more details.

⁶³ See Hall, P. (2002), pp. 56-66 for more details.

⁶⁴ See loc. cit., pp. 66-74 for more details.

⁶⁵ See loc. cit., pp. 107-110 for more details.

the main counties as well as labor market areas. Here the county, in which the city is located, is assumed as territorial unit for strategic land use planning for the period 1991-2002.⁶⁶ A labor market area is considered according to what Office of Deputy Prime Minister (ODPM) defines based on travel patterns in the 1991 census. It also stresses that population density and contiguous built-up areas play the key role in defining boundaries of urban areas by ODPM.⁶⁷

2.2.5.2. The United States

Regional thoughts and planning in the United States were initially established by a small group of academics known as Regional Planning Association of America (RPAA) through their critical assessments of the society, pointing to the socio-economic problems of their time. “The RPAA was formed in 1923 by a group of architects and planners who met in New York City for regular discussions of urban problems.”⁶⁸ The RPAA and its visions were, perfectly, reviewed by Carl Sussman (editor) in his book *Planning the Fourth Migration* in 1976, in which Lewis Mumford, Benton Mackaye, and others have also contributed. In the RPAA “the members sought to replace the existing centralized and profit-oriented metropolitan society with a decentralized and more socialized one made up of environmentally balanced regions.”⁶⁹ They also introduced the idea of statewide regional planning for the first time in the United States.⁷⁰ According to Friedmann and Weaver (1979: 30-35), the RPAA concentrated on the issues of metropolitanization, regions and regional balance, regional planning, and planning strategies. However, “for all their talk of learning about the concrete realities of regional life, they never seriously confronted the existence of widespread rural poverty nor developed the social implications of metropolitan financial dominance.”⁷¹ These aspects were later considered by southern academics whose

⁶⁶ See SELMA (2006), p. 36 for more details.

⁶⁷ See loc. cit. for more details.

⁶⁸ Friedmann, J. & Weaver, C. (1979), p. 29.

⁶⁹ Sussman, C. (ed.) (1976), p. 1.

⁷⁰ See loc. cit., p. 2 for more details.

⁷¹ Friedmann, J. & Weaver, C. (1979), p. 35.

interests covered the issues of underdevelopment, poverty, and marginalized settlements. But whatever the components of American regionalists' thoughts were, regional planning appeared in America in mostly scientific and academic atmosphere rather than through practical attempts to solve the existing problems in the reality, and borrowed much knowledge from European thinkers and pioneers, though it became part of political debates later in early 1930s. The main concepts of regional planning in 1920s and 1930s did not consider economic growth but addressed the ecological and social balance between city and countryside as well as human culture and the nature.⁷²

During the 1930s there were also some attempts to develop the idea of metropolitan planning. This concept covered mostly the description of how and based on which patterns a metropolitan grows up. The Chicago school of urban ecology was certainly one of the first advocates of this idea, which also influenced the National Planning Board (NPB) and its works later.⁷³ The decade witnessed two other major theory developments by the National Resources Committee (NRC)⁷⁴ and its members, including regionalism and urbanism. The more practical regional plans of this time were river basin development plans. The common focus of these plans was on the development of natural resources within areas located on the basis of physical water sheds and represented some examples of which Tennessee Valley Authority (TVA) was one of the most important projects (Friedmann and Weaver 1979: 68). The TVA was highly criticized because of its functions and results reached between 1930 and 1950, because it was not a regional planning approach what Mumford, Odum, and the others who developed organic regional planning concept had introduced. “[...] the TVA had proven itself to be a powerful instrument of urban-industrial expansion. If the TVA was to be a model for comprehensive river basin development, it would be a model which funneled resources and people into the metropolis.”⁷⁵

⁷² See loc. cit., p. 41 for more details.

⁷³ See loc. cit., p. 56 for more details.

⁷⁴ NPB became NRC by 1935, See loc. cit., p. 67 for more details.

⁷⁵ See loc. cit., p. 78.

Besides all critiques the TVA project received, it showed clearly that the economic characteristics of settlement development are also very important, for they attract the human activities as well as the population. Therefore, if the organic natural and cultural factors should be considered and conserved in a region, the economy should also be added to the regional debates. But it was not before the middle of 1950s that the economic aspect of regional planning was launched. One of the most well-known economists of the time was Walter Isard whose effective arguments in his book *Location and Space-Economy* 1956 woke up many of his contemporaries.

The ideas of unequal regional development and polarized development were also introduced in the last 3 years of 1950s. The economic aspects of regional development received also more attention in late 1950s and early 1960s when other scholars also concentrated on the form and balance of economic growth among regions. The concentrated economic growth brings about interregional inequalities among the regions (Myrdal, 1957). On the other hand the idea of polarized development introduced by Albert Hirschman (1959) was considering that there would be an unbalanced development among regions, which by the course of time would get balanced and equalized.

In early 1960s regional planning became as a field of study in academic atmosphere after John Friedmann started teaching regional planning at the MIT. He believed that regional planning might be assumed as an applied field of regional science strongly developed by the economists like Walter Isard offering their scientific analytical methods for regional studies.⁷⁶ The spatial organization, urbanization, and regional growth theory were the next evolutionary topic discussed in his publication of 1964 with William Alonso.

In 1990s, the most recognizable regional planning effort in the US was the *smart growth* started from the early 1970s. From 1981 to 1999 there were more than 27 million housing units built, mostly, in suburban areas in the 39 largest metropolitan regions, which were

⁷⁶ See loc. cit., pp. 118-119 for more details.

criticized by some urbanists arguing for more sustainable urban form, and which had own advocates stressing on negative growth controls especially an urban growth boundary.⁷⁷

The current regional planning system in the US represents a kind of metropolitan area planning which is classified based on the largeness and the population size residing in the area. Table 2.2 highlights some of the classifications of metropolitan areas in the US and the definitions and standards applied for each classification.

Table 2.2: standards for classification of metropolitan areas in the US

Classifications	Definition	
Core Based Statistical Areas (CBSAs)	A CBSA is a geographic entity associated with at least one core of 10,000 or more population, plus adjacent territory that has a high degree of social and economic integration with the core as measured by commuting ties. A CBSA includes central county or counties and outlying counties. The CBSAs are divided into two categories as follows:	
	<i>Metropolitan Statistical Areas (MSAs):</i> which must have a Census Bureau defined urbanized area of at least 50,000 population or more.	<i>Micropolitan Statistical Areas (McSAs):</i> which must have a Census Bureau defined urban cluster of at least 10,000 population but less than 50,000
MSA Divisions	A MSA containing a single core with a population of at least 2.5 million may be subdivided to form smaller groupings of counties referred to as Metropolitan Divisions. A Metropolitan Division includes a main county and other secondary counties.	
Combined CBSAs	The combination of adjacent CBSAs is under the following circumstances: - Any two adjacent CBSAs will form a Combined Statistical Area if the	

⁷⁷ Hall, P. (2002), p. 206.

	<p>employment interchange measure between two areas is at least 25,</p> <ul style="list-style-type: none"> - Adjacent CBSAs that have an employment interchange measure of at least 15 and less than 25 will combine if local opinion, as reported by the congressional delegations in both areas, favors combination, and - The CBSAs that combine retain separate identities within the larger Combined Statistical Areas. 	
New England City and Town Areas (NECTAs)	<p>NECTAs are intended for use with statistical data, whenever feasible and appropriate, for New England. NECTAs are categorized based on the same concepts as CBSAs using cities and towns instead of counties and could be divided as follows:</p>	
	<i>Metropolitan NECTA</i>	<i>Micropolitan NECTA</i>
NECTA Divisions	<p>A NECTA containing a single core with a population of at least 2.5 million may be subdivided to form smaller groupings of cities and towns referred to as NECTA Divisions. A NECTA Division must have a total population of 100,000 or more. If a city or town has a population of 50,000 or more and its highest rate of out-commuting to any other city or town is less than 20 percent, it qualifies to be a main city or town.</p>	
Combined NECTAs	<p>“The geographic components of Combined New England City and Town Areas are individual metropolitan and micropolitan NECTAs, in various combinations.”⁷⁸</p>	

Source: adapted from Federal Register (2000)

⁷⁸ OMB (2009): Update of Statistical Area Definitions and Guidance on Their Uses. Bulletin NO. 10-02. Office of Management and Budget. Washington. D.C. 20503. Available online at <http://www.whitehouse.gov/sites/default/files/omb/assets/bulletins/b10-02.pdf> on 15.10.2012.

2.2.5.3. Germany

“The German urban system is characterized by the long history of scattered regionalism, the so-called Kleinstaaterei, particularly during the 18th and early 19th century, and by the decentralized federal system after the Second World War. Both resulted in a dense network of vital small and midsize and some bigger cities and about a dozen conurbations, such as RhineRuhr and Rhine-Main.”⁷⁹ But the regional planning concepts and practices started in early 20th century, mainly regarding the problems of uncontrolled urban expansions as well as insufficient physical infrastructures (Mertins & Paal 2009). Two forerunner planning associations at this time are remarkable; The Ruhr Coalfield Settlement Association (Siedlungsverband Ruhrkohlenbezirk (SVR)) and Special Purpose Association Greater Berlin (Zweckverband Groß Berlin).

The SVR is an example of early development in regional planning, established in 1920 in Germany to concentrate on Ruhr Region. The most important innovation of SVR was to recognize that the existing problems in Ruhr could not be solved by individual towns, but through a regional planning scheme (Alden & Morgan, 1974). The SVR had received, according to the law, the power necessary for the development of the region, from all local authorities. The designation of future built-up area and the preservation of green spaces as well as public transport were some of its tasks (Mertins & Paal, 2009: 38). Cooperative planning activities, transportation planning, and some financial assistance to the individual local authorities have been the most noticeable innovations of SVR. Generally evaluating, “the SVR was successful in guiding development and preserving open space in the highly urbanized Ruhr area.”⁸⁰ Ruhr area experienced a dramatic decline in demand for coal in 1960s, causing a heavy decline in coal employment. Later in 1977 and after more than half a century of successful regional planning, the SVR was dissolved.⁸¹

The special purpose association for greater Berlin is another example of early spatial and regional planning between 1912 and 1921 in Germany. This association was formed

⁷⁹ Knapp, W. et al (2005), p. 2.

⁸⁰ Schmidt, S. & Buehler, R. (2007), p. 59, In: *International Planning Studies*, Vol. 12, No. 1, 55-75.

⁸¹ See Hall, P. (2002), p. 166 for more details.

through the unification of Berlin and six other districts as well as two counties around it.⁸² The association was responsible for the development and management of transportation, housing construction, and recreation and open spaces in the region.⁸³ In 1920, the constituent Prussian state assembly passed the bill on the formation of a new municipality for Berlin with the population of about 3.8 million and an area of 880 km².⁸⁴

After the 2nd world war, there were also some planning associations reactivating the planning communities of the 1920s. The communal working group Rhine-Neckar in 1951 and the regional planning association Frankfurt/Main in 1962 are two examples of them (Mertins & Paal 2009). In 1965, the Federal Spatial Planning Act (FSPA)⁸⁵ considered the issue of regional development and planning. This act sets the general guidelines to be followed by the federal states, and defines the relationship between the federal states and the federal government (Schmidt & Buehler 2007). In 1998, the two important issues of regional development concepts as well as urban networks were incorporated in Federal Regional Planning Act (FRPA).⁸⁶

German regional planning faced new challenges in the last two decades; first, after the unification of East and West Germany in 1990, and second, by entering to the European Union (EU). The unification of East and West Germany made a challenging situation in which Germany had to decide to balance the development of east and west. Taking into account the objectives of the Agenda 21 and considering the goals of sustainable development, Germany set the regulations for territorial planning under the title of FRPA in 1998, aiming at sustainable territorial planning (Mertins & Paal 2009).

⁸² These districts included Charlottenburg, Schöneberg, Wilmersdorf, Lichtenberg, Neukölln, and Spandau and the two counties were Niederbarnim and Teltow. Taken from the official web portal of Berlin at <http://www.berlin.de/rbmskzl/regierender-buergermeister/buergermeister-von-berlin/buergermeistergalerie/artikel.4556.php> on 20.02.2015.

⁸³ See Mertins, G. & Paal, M. (2009), p. 38, In: LUZÓN, J.L. & M. CARDIM (Eds.): *Estudio de casos sobre planeación regional*: 31-50 for more details.

⁸⁴ The new Berlin Municipality included Alt-Berlin together with 7 towns, 59 rural communities, and 27 "Gutsbezirke" and was divided into 20 districts. Taken from the official web portal of Berlin at <http://www.berlin.de/rbmskzl/regierender-buergermeister/buergermeister-von-berlin/buergermeistergalerie/artikel.4556.php> on 20.02.2015.

⁸⁵ Bundesraumordnungsgesetz (ROG).

⁸⁶ See Mertins, G. & Paal, M. (2009), p. 46, In: LUZÓN, J.L. & M. CARDIM (Eds.): *Estudio de casos sobre planeación regional*: 31-50 for more details.

The second challenging point for German planning system was to integrate the new spatial development policies set by the EU. In 1999, the EU released its own spatial plan, the *European Spatial Development Perspective* (ESDP), with the goal of working towards a balanced and sustainable development of European Union's territory.⁸⁷ "Germany integrated the European Union's Guideline 2001/42/EG in the Federal Regional Planning Act."⁸⁸ According to this guideline, the environmental aspects of strategic planning instruments should be checked through a systematic audit procedure called strategic environmental audit (Strategische Umweltprüfung) (Mertins & Paal 2009: 36).

2.3. Contents of Regional Planning

2.3.1. Population analysis

Regional planning in terms of planning for the future development of a region in a sustainable way requires analyzing the key factors playing the major roles in development of the region. These factors include economic development, land use planning, transportation planning, and population analysis and projections. The latter is of the most importance because the "population projections are the base for many planning activities, such as producing land use and transportation plans, determining the direction of future economic development and providing guidance for housing, school, and shopping center developments."⁸⁹ The population threshold is also one of the factors in prescribing the largeness of a region or metropolitan area. The example of American metropolitan areas (Table 2.2) showed that the most important factor in defining the structure and nature of a metropolitan area is the statistical basis in which the demographic changes play a key role. Any increase or decrease in population size, resulting either from the natural demographic changes or the migrations, determines the level of development and the extension to which the planning features for the other factors should be considered.

⁸⁷ See European Communities (1999), for more details.

⁸⁸ Mertins, G. & Paal, M. (2009), p. 36, In: LUZÓN, J.L. & M. CARDIM (Eds.): *Estudio de casos sobre planeación regional*: 31-50.

⁸⁹ Wang, X. & Vom Hofe, R. (2007), p. 53.

2.3.2. Economic development

Economic development is the driving engine in reaching the balanced development across a region. Expanding the economic activities, such as building a new manufacturing unit, in a region creates job opportunities, directly for the work power and indirectly for other local service businesses, and improves the whole economic circulation in the region, increasing also the local government's revenues.⁹⁰ Generally and to estimate the ultimate changes in the regional economy, the economic development plans and new activities should be analyzed to estimate the total output and impact on the employment and income generation for the residents as well as the local government. This is done through an impact analysis employing the multipliers to estimate the total effects on variety of factors such as employment in the region.⁹¹ In fact, the estimation of total effects of economic developments in the region provides the plan-makers with better understandings of economic situation to conduct the regional planning processes on the way of achieving more balanced regional development.

2.3.3. Land use planning

As an important part of the regional planning, the land use planning refers to the human activities on the land and answers to the questions of where an activity should be placed and why. The land use analysis allows the planners to understand which plot of land is suitable for which activity and to dissect the impacts of a given activity on the landscape.⁹² Therefore, planning for future changes in a region, as the main reason behind the planning itself, needs to carry out the land use studies for any given place in the region, where the changes are going to take place. "In short, land use analysis is a set of tools that helps to understand: (1) how land is currently used; (2) what land use changes can be made in accordance to a set of rules; and (3) what are the impacts of land use changes."⁹³ Hence, a

⁹⁰ See loc. cit., p. 134 for more details.

⁹¹ See loc. cit., pp. 134-135 for more details.

⁹² See loc. cit., p. 273 for more details.

⁹³ See loc. cit., p. 274.

regional plan wishing to control the development activities across a given region should have the land use analysis as the routine part of its regional studies to monitor the use of land and to be able to take the right decision in accordance to the development goals of the region when it is needed.

2.3.4. Transportation planning

The transportation within and among regions refer to the population and goods flow in terms of daily travels, commuting to the workplace, and the transportation of goods and products to the more local distribution and shopping centers. “Transportation planning is a process of finding feasible alternatives and components of a transportation system to support human activities in a community.”⁹⁴ As the human activities take place in different parts of a region, a transportation network is needed to connect all those activities together. The transportation planning in a region considers the traffic associated with the designated land use, the transportation modes, the roads networks, and the necessary roadway facilities in order to estimate the traffic volume and the efficiency of the transportation system.⁹⁵ Transportation analysis has a direct relation with the land use planning and the locations of settlements and economic activities in the region because the land use plans determine the location of future developments and changes for which the existing transportation facilities should be adapted and the new ones should be prepared.

⁹⁴ See loc. cit., p. 327.

⁹⁵ See loc. cit. for more details.

2.4. Regional planning concept in Persian literatures

2.4.1. Introduction

Although the scientific base for regional planning in Iran is relatively strong, the outputs of regional plans and the efficiency of what is planned and practiced, under the umbrella of regional planning, must be examined. The concepts of urban and regional planning, their definitions, and their methods have also been worked on for decades. The planning history in Iran, in general, goes back to the late 1930s when the cabinet recognized the need for economic planning and established the first Economy Council (Šorāye Eqtešād) of Iran. This council created a commission for goods production planning (Komisyune Tahiaye Barnāma Barāye Tolide Maḥsulāt), which released a seven-year agricultural plan (Barnāmaye Haft Sālaye Kešāvarzi).⁹⁶

In 1944, the cabinet established a new High Council of Economy (Šorāye āliye Eqtešād) which suggested the creation of a Board for Providing Development and Reform Plan (Heyate Tahiaye Naqšaye Ešlāḥi va (omrāniye Kešvar) in 1946.⁹⁷ The cabinet ratified the creation of the board immediately. Shortly after the creation of the board, it published its first report which was the basic draft for the first seven-year development plan of Iran, and the cabinet ratified the draft in the same year.⁹⁸

The year 1946 witnessed another significant decision made by the cabinet, which was the establishment of High Board of Plan (Heyate āliye Barnāma) under the supervision of Prime Minister.⁹⁹ However, it was not before 1948 that the national parliament ratified the seven-year development plan of Iran which was going to be implemented from 1948 to 1955. This was the beginning point of planning, plan making, and plan organization in Iran. The national parliament ratified also the establishment of Planning Office Administration

⁹⁶ See Ziari, K. (2009), p. 157 for more details.

⁹⁷ See loc. cit. for more details.

⁹⁸ See loc. cit. for more details.

⁹⁹ See loc. cit., pp. 157-158 for more details.

(Edārehye Daftare Kolle Barnāma) later changed to Temporary Organization for Plan (Sāzmāne Movaqqate Barnāma).¹⁰⁰

As the table 2.3 shows, four more development plans were ratified and implemented until 1977 of which the 3rd and 4th plans stressed on regional studies and projects.

Table 2.3: list of Iran's development plans from 1948 to 1978

Title of plan	Ratified in	Began in	Ended in	Duration	Type of Plan	Legal base
1 st Plan	1948	1948	1955	7 years	Collective Plans	National Parliament
2 nd Plan	1955	1955	1962	7 years	Collective Plans	National Parliament
3 rd Plan	1962	1962	1967	5.5 years	Comprehensive	National Parliament
4 th Plan	1967	1968	1972	5 years	Comprehensive	National Parliament
5 th Plan	1972	1973	1977	5 years	Comprehensive	National Parliament
Reviewed 5 th Plan	1975	-	1977	-	Comprehensive	National Parliament
6 th Plan	Not ratified	1978	1982	5 years	Comprehensive	Not ratified

Source: adapted from Tabesh, A. (1996), in Ziari, K. (2009), p. 162

After the Islamic revolution in 1979, the planning schemes and priorities were refreshed by the new government. One of the significant early attempts was the ratification of Country's Planning Discipline (Nezāme Barnāma Riziye Kešvar) by the economy council in 1981.¹⁰¹ In 1982, the economy council reviewed also the first 5-year national development plan of Iran for the years 1983 to 1987, but it was not ratified earlier than in 1990 because of the war and especial conditions of the country. In this year, the Islamic Parliament of Iran

¹⁰⁰ See loc. cit., p. 159 for more details.

¹⁰¹ See loc. cit., pp. 159-160 for more details.

announced the ratification of the 1st five-year development plan for the time period of 1990 to 1993.¹⁰² Some of the regional planning-related objectives of this plan included spatial reorganization and geographic redistribution of the population and activities based on each region's potentials, decentralization of population and activities from Tehran to some other selected regions, revitalization of intermediate-sized cities, and pushing forward regional development poles to stop migration into the large cities.¹⁰³

In 1995, the second five-year development plan was also ratified after a two years of interruption.¹⁰⁴ The most important objectives of the second plan included fair distribution of resources and facilities among all provinces positioning below the national overall standards, more attention to be paid to the deprived regions, and decentralization of the decision-making processes and stronger involvement of the provinces.¹⁰⁵

Table 2.4: list of Iran's development plans from 1983 to 1995

Title of plan	Prepared in	Ratified in	Began in	Ended in	Duration	Type of Plan	Legal base
1 st Plan	1983	1983	Not implemented	Not implemented	5 years	Comprehensive	The Cabinet
Reformed 1 st Plan	1985	Not ratified	Not implemented	Not implemented	5 years	Comprehensive	-
New Conditions of Economic Independence	1986	1986	1986	1987	2 years	Limited deployment	Economy Council
1 st Plan	1988	1989	1989	1993	5 years	Comprehensive	Islamic Parliament
2 nd Plan	1993	1994	1995	1999	5 years	Comprehensive	Islamic Parliament

Source: adapted from Tabesh, A. (1996), in Ziari, K. (2009), p. 163

¹⁰² See loc. cit., pp. 160-161 for more details.

¹⁰³ See Sarrafi, M. (1998), p. 86 for more details.

¹⁰⁴ See Ziari, K. (2009), p. 161 for more details.

¹⁰⁵ See Sarrafi, M. (1998), pp. 86-87 for more details.

Table 2.5: list of Iran's national development plans from 1999 to 2015

Plan's title	Prepared in	Ratified in	Began in	Ended in	Duration	Type of Plan
3 rd Plan	1999	2000	2000	2004	5 years	Comprehensive
4 th Plan	2003	2004	2005	2009	5 year	Comprehensive
5 th Plan	2009	2010	2011	2015	5 year	Comprehensive

Source: adapted from the 3rd, 4th, and 5th 5-year development plans of Iran

2.4.2. Regional and spatial planning

The regional planning concept started, in practice, in early 1950s in Iranian young planning system and in the context of national development plans. The very important examples of this period were *Dašte Moğān Development Program* of 1953, as part of the 1st 7-year development plan, and *Kūzestān Region Development Plan* as part of the 2nd 7-year development plan (see table 2.3).¹⁰⁶ During the 1960s, regional planning got the legal values in the 3rd five-year development plan¹⁰⁷ and mostly because of its decentralization aspects. During this decade the 3rd and the 4th five-year development plans were under the implementation, and some comprehensive regional plans including *Jiroft Region Development Plan*, *Qazvin Plain Development Plan*, *Kohgiluyeh Development Organization*, and *Gorgān Plain Development Plan* were considered.¹⁰⁸ In the 4th five-year development plan in particular, the development of industrial cities e.g. Eşfahān, Ahvāz, Arāk, and Tabriz were considered. The same industrial development schemes were pursued in Šīrāz, Qazvin, Mašhad, and Bāk̄tarān Cities in this period.¹⁰⁹

Having focused on the socio-economic aspects of the regional development, the policies stressed more on the comprehensive plans during the 1960s and 1970s. The article 17 of the

¹⁰⁶ See loc. cit., pp. 72-73 for more details.

¹⁰⁷ The 7-year national development plans of Iran turned into 5-year plans after 1962 (see table 2.3).

¹⁰⁸ See Daneshvar, T. (2002), pp. 131-132 for more details.

¹⁰⁹ See loc. cit., p. 133 for more details.

3rd and 4th five-year development plans were the first legal bases strengthening the regional planning issues as well as the participation of local authorities in plan-making procedures.¹¹⁰ During the years 1969 and 1970, regional studies were given to the private sector companies e.g. *Battelle Institute*, *Scet Cop Consulting Engineers*, *Scetiran Consulting Engineers*, and *Kāvāb (Ābkāv) Consulting Engineers*.¹¹¹

The 3rd and the 4th national five-year development plans focused deeply on regional planning approaches. In the late 1970, an analysis by Battelle Institute showed that the variety of plans, different governmental bodies, various private sector actors, and different regional needs and characteristics made the regional plans not to be efficient. Therefore, the whole country was divided into 11 regions, which were larger than the existing provinces, to have a better coordination among governmental and local authorities as well as a more integrated and realistic results of studies on all regions.¹¹² The establishment of a regional development office in each of the 11 regions was another recommendation of this analysis. However, these recommendations were considered in conflict with the local and sectoral plans and neglected, so they did not taken into account in the 5th development plan.

The regional planning objectives were more considered in the 5th five-year development plan during the 1970s. “The equal economic development for all provinces, equal service distribution, public participation, and strengthening socio-economic infrastructures in all provinces were the major objectives of the 5th five-year development plan.”¹¹³

¹¹⁰ See Ziari, K. (2009), pp. 165-166 for more details.

¹¹¹ See Daneshvar, T. (2002), pp. 134-135 for more details.

¹¹² See Sarrafi, M. (1998), p. 75 for more details.

¹¹³ Ziari, K. (2009), p. 168.

2.4.2.1. Spatial planning of Iran (SPI)

In the middle of 1970s, the need for a spatial planning scheme (Āmāyeše Sarzamin) in terms of land use planning was recognized and the preparation phase was started. The Center for Spatial Planning (Markaze Āmāyeše Sarzamin) was opened in 1975 and the first and second reports on the plan were prepared by *Scetiran consulting engineers* in 1976 and 1977.¹¹⁴ In their second and final report *spatial planning long-term strategy* they divided the whole country into 8 mega regions and discussed about the urban systems, rural communities, Kūzestān-Ādārbāyjān axis, and the decentralization of second and third sectors.¹¹⁵

2.4.2.2. Islamic spatial planning; basic plan

Early 1980s witnessed another form of spatial planning studies. The regional planning office (Daftare Barnāma Riziye Manṭaqai) of the Plan and Budget Organization¹¹⁶ (PBO) released the basic plan's studies which covered items e.g. spatial organization of the country, the population and communities, human activities, climate, potentials, and risks in 1983.¹¹⁷ This office prepared also the theoretical development framework for all provinces which led later to the preparation of Provincial Comprehensive Development Plans (Ṭarḥ Hāye Jāme'e Tose'eye Ostāni), for all provinces, prepared by the PBO office in each province.¹¹⁸

¹¹⁴ See Tofigh, F. (2005), pp. 2-3 for more details.

¹¹⁵ See Ziari, K. (2009), p. 169 for more details.

¹¹⁶ The Plan and Budget Organization (PBO) was a public organization in Iran, which merged with Organization for Administrative and Employment Affairs in 2000 and made the Management and Planning Organization.

¹¹⁷ See Tofigh, F. (2005), p. 3 for more details.

¹¹⁸ See Sarrafī, M. (1998), pp. 83-84 for more details.

2.4.2.3. Eastern axis development studies

Based on the symmetric and equalized development strategy against the Kūzestān-Ādārbāyjān axis (western axis) proposed by Scetiran's plan, the eastern axis development studies began in 1986 in a conference held in Zāhedān City (Southeast Iran), to set up the strategic goals of economic development in the province in line with its socio-cultural and political conditions.¹¹⁹

2.4.2.4. Return of the spatial planning of Iran

The end of 1990s was again the time to pay attention to the Spatial Planning of Iran (SPI), as it was reflected in the 3rd five-year development plan's bill prepared for the period between 2000 and 2004 though removed before the ratification by the Islamic parliament. Finally, the Islamic parliament ratified the act *implementation of article 48 of the basic law* bounding the government to prepare the National Spatial Planning Plan.¹²⁰

Box 2.3: objectives of the act 'implementation of article 48 of the basic law'

- Assuring the equal usage of natural resources and national capitals by all regions (provinces and counties) in the country,
- Providing all regions (provinces and counties) with the development tools and actions equal to their capabilities and with the positive competition,
- Equal distribution of economic activities in all regions (provinces and counties), and
- Efficient usage of capabilities and advantages in line with the country's regional and international role.

Source: adapted from Tofigh, F. (2005), p. 5

¹¹⁹ See Tofigh, F. (2005), p. 3 for more details.

¹²⁰ See loc. cit., p. 5 for more details.

2.4.2.5. National and regional physical plans

Following the *Country's Master Plan Act* of 1974, the guidelines for preparation of National and Regional Physical Plans (NRPP) was set by the Kāvāb and Mehrāzān Consulting Engineers in 1990 and the national plan was ratified by the HCUDA¹²¹ in 1996. The similarities between the two spatial plans namely NRPP prepared by the MHUD and SPI prepared by the PBO could result conflicts between two authority organizations. Therefore, the High Council of Administration (Šorāye āliye Edāri) vouchsafed the responsibility of preparing SPI, in terms of spatial distribution of population and activity throughout the country, to the PBO to submit to the cabinet and the responsibility of preparing NRPP to the MHUD to submit to the HCUDA for the final ratification.¹²²

The NRPPs include national physical plans as well as regional plans and studies. Box 2.4 shows the goals of national physical plan.

Box 2.4: goals and objectives of the national physical plan

- Investigating the suitability of land plots for the future development of current cities and for building up new towns,
- recommending the future network of cities in terms of their largeness, their location in the country, and their rankings, and
- Recommending a regulatory framework for buildings construction in permitted land use schemes throughout the country.

Source: adapted from Tofigh, F. (2005), pp. 6-7

Three planning levels of national, regional, and local are recognized in the context of national physical plan, in which the scale of regional plans match the provinces and the

¹²¹ High Council of Urban Development and Architecture. See the list of abbreviations.

¹²² See loc. cit., p. 6 for more details.

local plans function in the level of cities and rural areas.¹²³ “In national physical plan, the whole country is divided into 10 mega regions and 85 local spatial planning districts.”¹²⁴

Box 2.5: the most important focal points of studies in national physical plan

- Population and space,
- Space management,
- Environment protection and historical monuments and sites, and
- Natural hazards.

Source: adapted from Kāvāb Consulting Eng. (1990), in Ziari, K. (2009), p. 186

The regional physical planning is considered in those 10 mega regions divided in the national physical plan as mentioned above. Here the regional division is based on the previous divisions carried out by various projects and their partners in the past. Table 2.6 gives an overview of the regional division history and table 2.7 highlights the regional division of national physical plan.

¹²³ See Daneshvar, T. (2002), pp. 158-159 for more details.

¹²⁴ Tofigh, F. (2005), p. 8.

Table 2.6: an overview of the regional division history in Iran

Project/Plan	Year	Contractor/Partner	Divisions
Battelle regional development plan (Barnāmaye (omrāne Maṭṭaqai)	1972	Battelle Consulting Eng.	11 mega regions
Protein Production Comprehensive Plan (Ṭarḥe Jāme(e Tolide Porotein)	1972	FMC Consulting Eng.	14 mega regions
Spatial planning studies (Ṭarḥe Āmāyeše Sarzamin)	1975	Scetiran Consulting Eng.	8 mega regions
Comprehensive cultivation plan (Ṭarḥe Jāme(e Kešt)	1976	Bockers and Hunting Consulting Eng.	10 mega regions
9-region division (Manāṭeqe Nohgāna)	1981	The ministry of Interior	9 mega regions
Water and power Organizations (Sāzmānhāye Āb va Barq)	Not available	The ministry of Energy	11 mega regions
Comprehensive water plan (Ṭarḥe Jāme(e Āb) (Jāmāb)	1986	The ministry of Energy, Jāmāb Consulting Eng.	8 mega regions

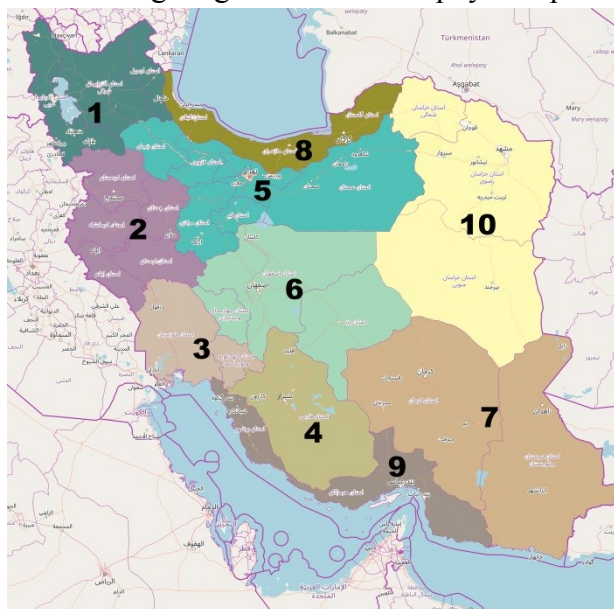
Source: adapted from Ziari, K. (2009), pp. 171-174 & Tofigh, F. (2005), p. 9

Table 2.7: regional divisions addressed in national physical plan

Regions		Provinces included
1	Āḡarbāyjān	Eastern Āḡarbāyjān, Western Āḡarbāyjān, Ardebil
2	Zāgros	Hamedān, Kermānšāh, Kordestān, Lorestān, Ilām
3	Ḳuzestān	Ḳuzestān, Kohgiluye va Boyer Aḥmad
4	Fārs	Fārs
5	Alborze Jonubi (South Alborz)	Tehran, Markazī, Semnān, Zanjān, Qazvin, Qom
6	Markazi	Eṣfahān, Yazd, Čehār Maḥāl va Baḳtiāri
7	Maṇṭaqeye Jonube Šarqi (Southeastern Region)	Kermān, Sistān va Balučestān
8	Maṇṭaqeye Savāḥele Šomāli (North Coastal Region)	Gilān, Māzandarān, Golestān
9	Maṇṭaqeye Savāḥele Jonubi (South Coastal Region)	Hormozgān, Bušeḥr
10	Ḳorāsān	Ḳorāsān

Source: adapted from Tofigh, F. (2005), p. 10

Figure 2.1: 10 mega regions in national physical plan of Iran



Source: self-collected information performed on OpenStreetMap 2017

The contents of regional physical plans for these mega regions include a wide-range of themes and studies e.g. demographic, economic, roads and transport, land use, etc. highlighted in table 2.8.

Table 2.8: contents of regional studies for mega regions under the regional physical plans

Themes of studies	
Population	Cultural heritage, tourism, and natural attractions
Cities and services' network	Environment
Segregation and privation reduction	Water consumption and resources
Industry and mining	Underground water and geotechnical studies
Soil and agriculture	Flood hazards zoning
Communication network	Modifying permitted land use and regulating construction codes in flood zones
Roads network	Modifying permitted land use and regulating construction codes in geotechnical studies zones
Energy production and distribution network	
Climate, building, and tranquility	Rural network
Land use	Economic overview

Source: adapted from Tofigh, F. (2005), p. 11

Table 2.9: the list of development plans in current Iranian national, regional, and local development levels

Type of development plan		Level of inclusion/Area of coverage
1.	Country's Master Plan	Country-wide
2.	National and Regional Physical Plans (NRPP)	National and regional-wide plans dividing the whole country into 10 large regions

3.	District Development Master Plan	Includes one or more counties with the same economic, environmental, and demographic characteristics
4.	Metropolitan Region Plan	Provincial level
5.	Rural Settlements' Spatial Improvement Plan	Includes one or more rural settlements based on the details determined in district master plan
6.	City master plan (Ṭarḥe Jāme'e Šahr)	Includes a whole county
7.	City conductive plan (Ṭarḥe Hādiye Šahr)	Includes a county having no master plan
8.	City detailed plan (Ṭarḥe Tafšili)	Includes the detailed and step-by-step planning and implementation features for a city
9.	Rural conductive plan (Ṭarḥe Hādiye Rustā)	Includes development plans for a village or a rural settlement
10.	Especial plans	Includes rural settlements locating in especial areas e.g. on the boarders, on river basins, etc.
11.	New towns plan	Includes the new towns supposed to be built up
12.	Residential towns plan	Includes the process of planning for a new residential town out of territorial boundaries of the cities
13.	Other towns plan	Includes the process of planning for a new industrial, tourist attraction, etc. towns

Source: adapted from Secretariat of High Council of Architecture and Urban Development (2000)

2.4.3. Metropolitan region planning in Iran

The last two decades have witnessed the creation and evolution of Metropolitan Region Plan (MRP), for metropolitan regions, in Iranian development planning structure. The metropolitan region “is a geographic spatial system composed of several towns and populated centers with correlation and interaction among them, creating an integrated spatial system. The integrated spatial planning and management takes place in such a system.”¹²⁵ The MRP tries to define the metropolitan region and mark up its boundaries as well as to discover the relationships among all urban and rural areas within its boundaries. The first MRP was started in 1995 after the cabinet of ministers ratified the act *Planning and Management of Tehran Metropolitan Region and the Country's other Large Cities and their Suburbs* (see section 4.5.). Therefore, the MRPs defined so far are the first attempts in each metropolitan region and are mostly in the phase of basic studies and investigations. After the TMRP, more MRPs have been prepared for other large metropolitan areas in Iran, namely Eşfahān, Mašhad, Tabriz, and Širāz.

2.5. Conclusions

The issue of regional planning is highly known in Iranian planning system, but the whole central-oriented planning scheme of the country does not allow the regional-level plans to be put into practice. The knowledge of regional planning is up-to-date and there is a lot of expertise on the ground either in academic atmosphere or amongst officials in public sector. There are also too many text books both written by the native experts and also translated from the western literatures, but the implementation of what is internationally understood from regional planning could hardly be proved here. The actual and current regional planning model in Iran considers the highly urbanized provinces with densely populated cities and towns as a metropolitan region. The metropolitan region plan is, then, assumed as an upper plan to the master and detailed plan in the development planning hierarchy of a province.

¹²⁵ Urban Planning and Architecture Research Center of Iran (2004), p. 10.

But the highly centralized planning, management, and budgetary system ties down this kind of regional plans and they stay only in the phase of studies and analyses. This is what makes the regional plans not to have pragmatic approaches to problems caused by the high energy consumption in the region especially around large cities in Iran though there are also various sectors actively engaged and working on energy efficiency issues independently (see section 3.8.3.).

Besides the centralized system of management and policy-making for the development issues, another important factor is the way the development plans have been defined and classified. For instance, in a province as a metropolitan region there are master plans for a number of counties and cities, detailed plans for the same counties and cities, city conductive plan for cities having no master plan, and rural conductive plan for the rural areas. This kind of planning classification makes the counties and cities carry out the development activities within their own boundaries, mostly, in terms of land use planning. But besides this positive independency for local authorities, there are some negative aspects especially when it comes to the matter of bilateral projects, budgetary, political interests etc. and being obliged to participate in an integrated urban management system in a metropolitan region or a province. This is exactly the case in Tehran Province whose regional plan is presented in chapter 4 as a case study. Therefore, it could be concluded that “in current urban planning system in Iran, the regional plans are not considered at all and the MRUD does not care about any larger scale plans than the master plan specifying the land use policies in a county or a town.”¹²⁶

¹²⁶ Taken from the interview with Mr. Dr. Saeid Izadi, board of managers in Urban Planning and Architecture Research Center of Iran on 19.05.2012.

3. Energy Efficiency; a tool of climate protection

3.1. Introduction

The use of fossil-based fuels is the major reason behind the emission of CO₂ and the formation of Greenhouse Gases (GHGs) in the earth's envelope. The fossil energies are used in different sectors including residential, industrial, transportation, electricity and heat generations, and other smaller scale consumption types. "Since the industrial revolution, about 375 billion tonnes of carbon have been emitted by humans into the atmosphere as carbon dioxide (CO₂). Atmospheric measurements show that about half of this CO₂ remains in the atmosphere and that, so far, the ocean and terrestrial sinks have steadily increased."¹²⁷ The GHGs have already caused the change of climate in the world, which in turn, have affected many countries worldwide. This chapter tries to explain, first, the impacts of climate change on world's urban regions and the reactions of regional planning to this phenomenon, and second, to examine how the planning system in Iran has adapted itself to reducing the use of energy in different consumption types and to dealing with the climate change impacts on its urban regions.

3.2. Urbanization and energy usage

More than half of the energy produced is used in cities and urban areas around the world. This is because more than half of the world's population is already urban and it is even estimated that about 200,000 people on average would be added to the urban population every day between 2010 and 2015.¹²⁸ This phenomenon shows a continuing rural-urban migration as well as a non-stop growing urbanization which, in turn, "will lead to a significant increase in energy use and CO₂ emissions."¹²⁹ Another estimation made by the UN gives an overview of 59.9 percent of the world's population living in urban areas by

¹²⁷ WMO (2012), p. 1.

¹²⁸ See UN-Habitat (2013), p. 25 for more details.

¹²⁹ OECD (2010), p. 38.

2030.¹³⁰ This proves the need for more energy supply in the future and also warns of a higher CO₂ and GHG emissions. According to the OECD (2010), most of the GHG emissions in OECD cities are driven by the energy services provided for residential, commercial, and transportation sectors rather than by industrial activities.¹³¹

3.3. Global climate change

3.3.1. Climate

The IPCC (2013) defines the term climate as “the average weather, or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years.”¹³² It also adds that the climate, in a wider meaning, includes not only the average conditions, but also other associated statistics and parameters to describe phenomena such as droughts.¹³³

The “Climate refers to the average weather¹³⁴ in terms of the mean and its variability over a certain time-span and a certain area.”¹³⁵ The climate depends highly on the place or area and its geographical characteristics e.g. latitude, vegetation, presence or absence of mountains, distance to the sea etc. as well as on the time periods such as from year to year, decade to decade or longer time-scales.¹³⁶

¹³⁰ See IPCC (2014), p. 95 for more details.

¹³¹ See OECD (2010), p. 17 for more details.

¹³² IPCC (2013), p. 126.

¹³³ See loc. cit. for more details.

¹³⁴ To better understand the climate and changes in it caused by the human activities, the IPCC (2001), p. 87 suggests that the two terms ‘weather’ and ‘climate’ should be clearly defined. So, It defines the term ‘weather’ as follows:

The “weather”, as we experience it, is the fluctuating state of the atmosphere around us, characterised by the temperature, wind, precipitation, clouds and other weather elements. This weather is the result of rapidly developing and decaying weather systems such as mid-latitude low and high pressure systems with their associated frontal zones, showers and tropical cyclones.

¹³⁵ IPCC (2001), p. 87.

¹³⁶ See loc. cit. for more details.

3.3.2. Climate system

According to IPCC (2001), the climate system is an interactive system consisting of five major components [including] the atmosphere¹³⁷, the hydrosphere¹³⁸, the cryosphere¹³⁹, the land surface, and the biosphere¹⁴⁰, forced or influenced by various external forcing mechanisms, the most important of which is the Sun. The human activities directly affecting the climate system are also considered as an external forcing.¹⁴¹ The most important part of these activities refers to the use of energy and the production of greenhouse gases which are directly sent to the atmosphere, as “the atmosphere¹⁴² is the most unstable and rapidly changing part of the system.”¹⁴³

3.3.3. Climate change

The global climate has been changing since the middle of 19th century as a result of fossil fuel combustion as well as revolutionary industrial activities. The use of fossil fuel in different energy production and energy consumption sectors releases carbon dioxide¹⁴⁴ gas, which together with other natural and chemical gases e.g. methane¹⁴⁵, nitrous oxide¹⁴⁶, water vapor¹⁴⁷, ozone¹⁴⁸⁻¹⁴⁹, and Chlorofluorocarbon¹⁵⁰, shapes the greenhouse gases in the

¹³⁷ The gaseous envelope surrounding the earth, divided into five layers – the **troposphere** which contains half of the earth’s atmosphere, the **stratosphere**, the **mesosphere**, the **thermosphere**, and the **exosphere**, which is the outer limit of the atmosphere. IPCC (2014), Annex I, p. 5.

¹³⁸ The component of the climate system comprising liquid surface and subterranean water, such as: oceans, seas, rivers, fresh water lakes, underground water etc.. IPCC (2001), Appendix I, p. 792.

¹³⁹ The component of the climate system consisting of all snow, ice, and permafrost on and beneath the surface of the earth and ocean. IPCC (2001), Appendix I, p. 789.

¹⁴⁰ The part of the earth system comprising all ecosystems and living organisms, in the atmosphere, on land (terrestrial biosphere) or in the oceans (marine biosphere), including derived dead organic matter, such as litter, soil organic matter and oceanic detritus. IPCC (2014), Annex I, p. 7.

¹⁴¹ See IPCC (2001), p. 87 for more details.

¹⁴² The Earth’s dry atmosphere is composed mainly of nitrogen (N₂, 78.1% volume mixing ratio), oxygen (O₂, 20.9% volume mixing ratio), and argon (Ar, 0.93% volume mixing ratio). These gases have only limited interaction with the incoming solar radiation and they do not interact with the infrared radiation emitted by the Earth. IPCC (2001), p. 87.

¹⁴³ See loc. cit.

¹⁴⁴ CO₂

¹⁴⁵ CH₄

¹⁴⁶ N₂O

¹⁴⁷ H₂O

earth's atmosphere. "These so called greenhouse gases, with a total volume mixing ratio in dry air of less than 0.1% by volume, play an essential role in the Earth's energy budget. Because these greenhouse gases absorb the infrared radiation emitted by the Earth and emit infrared radiation up- and downward, they tend to raise the temperature near the Earth's surface."¹⁵¹ This phenomenon continues to happen on a daily base and makes the Earth's surface warmer and, in turn, affects the cryosphere and the biosphere on the lands' surface. In a long-term, these changes affect also the regional and global climate in terms of weather conditions, precipitations, sea levels, and the number of warm and cool days and nights. Therefore, the definition of climate change refers "to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods."¹⁵²

Based on the definitions given by IPCC (2013), the climate change refers to "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer."¹⁵³

¹⁴⁸ O₃

¹⁴⁹ *The atmospheric distribution of ozone and its role in the Earth's energy budget is unique. Ozone in the lower part of the atmosphere, the troposphere and lower stratosphere, acts as a greenhouse gas. Higher up in the stratosphere there is a natural layer of high ozone concentration, which absorbs solar ultra-violet radiation. In this way this so-called ozone layer plays an essential role in the stratosphere's radiative balance, at the same time filtering out this potentially damaging form of radiation.* IPCC (2001), p. 88.

¹⁵⁰ CFCs

¹⁵¹ IPCC (2001), pp. 87-88.

¹⁵² UNFCCC (2011), p. 2.

¹⁵³ IPCC (2013), p. 126.

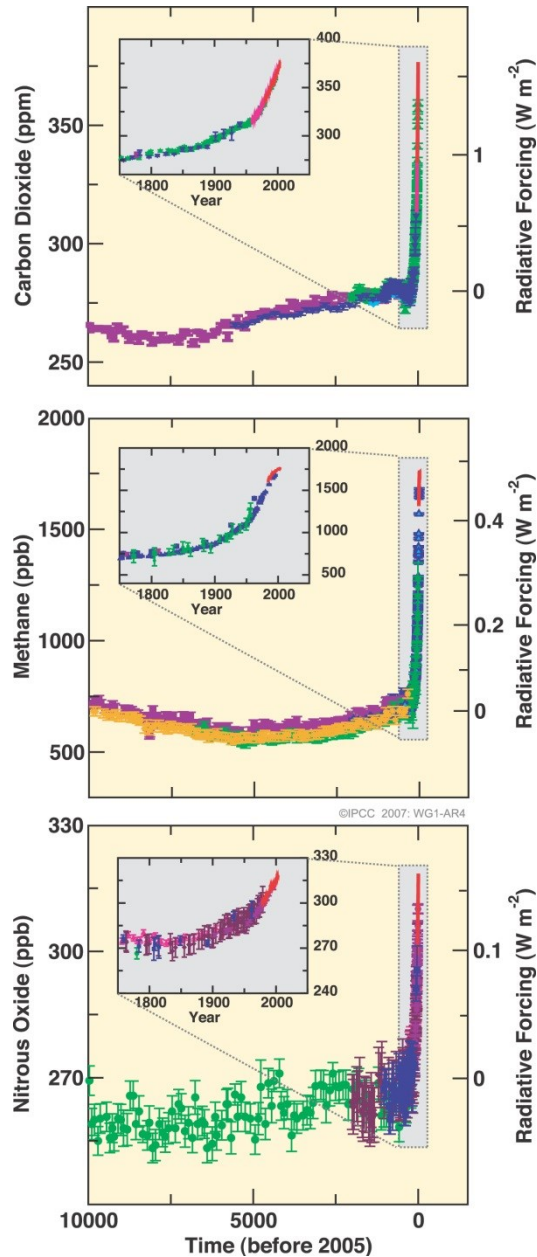
3.3.4. Climate change indicators

There are certain and particular impacts of the climate change phenomenon on the earth's whole and regional environment, which are known as climate change indicators. These indicators mostly refer to the rising temperature on the earth's surface and to the level of water on its water sinks. The IPCC (2013) sets these indicators as follows:¹⁵⁴

- Increasing GHG concentrations,
- Rising global surface temperature,
- Extreme weather conditions including more warm and less cold days as well as unusual precipitation records,
- Increasing global sea level,
- Ocean acidification and warming, and
- Decreasing annual average Arctic sea ice extent.

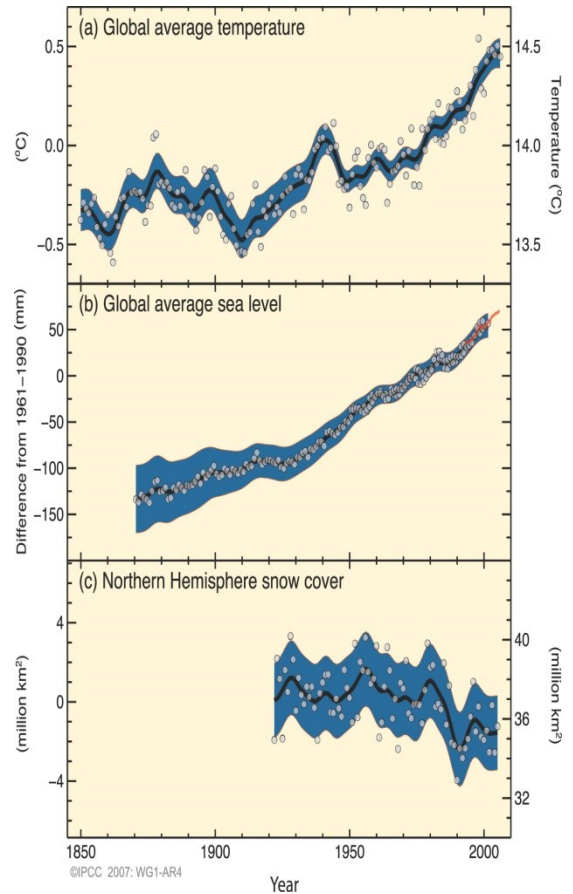
¹⁵⁴ See loc. cit., pp. 130-137 for more details.

Figure 3.1 (left): atmospheric concentrations of carbon dioxide, methane, and nitrous oxide over the last 10,000 years



Source: adapted from IPCC 2007, Summary for policymakers, p. 3

Figure 3.2 (right): observed changes in global average surface temperature, global average sea level, and Northern Hemisphere snow cover



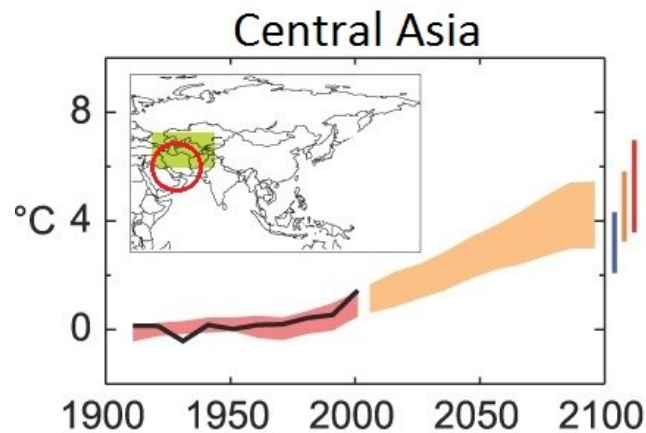
Source: adapted from IPCC 2007, Summary for policymakers, p. 6

3.4. Climate change impacts on world's regions

The major impact of the climate change is the warming of the globe. “There has been a mean global warming of 0.4 to 0.8°C of the atmosphere at the surface since the late 19th century.”¹⁵⁵ The global warming has, then, its own impacts on the sea level, for it causes the sea ice and polar ice sheets to melt. “Sea level has risen during the 20th century by 10 to 20 cm and there has been a general retreat of glaciers worldwide, except in a few maritime regions, e.g. Norway and New Zealand.”¹⁵⁶ The other impacts of global warming are the severe weather events such as heavy rainfalls and flash floods, already happened in parts of Asia and central Europe, as well as heat waves and droughts in the Russian Federation, China, and sub-Saharan Africa.¹⁵⁷

Figure 3.3 shows the changes in temperature in Central Asia during two centuries. The figure highlights the temperature change trends based on the changes in 1901 to 1950. The black line represents the changes in 1906 to 2005. The red envelope is the simulation made by MMD¹⁵⁸ models and the orange envelope is the projected changes for 2001 to 2100.¹⁵⁹

Figure 3.3: temperature anomalies projected for 2001-2100 based on temperature changes from 1906 to 2005 for Central Asia Region



Source: adapted from IPCC 2007, p. 882

¹⁵⁵ IPCC (2001), p. 96.

¹⁵⁶ See loc. cit., p. 97.

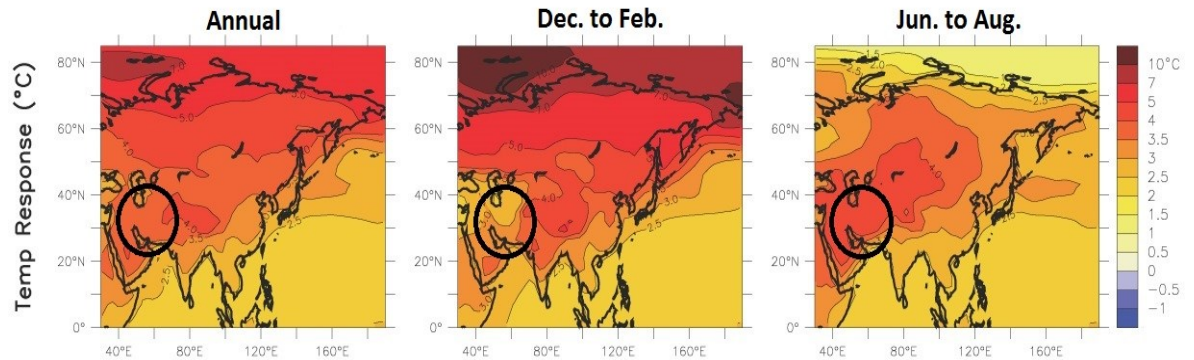
¹⁵⁷ UNFCCC (2011), p. 1.

¹⁵⁸ *Multi-Model Data set, program for climate model diagnosis and intercomparison*. IPCC (2007), pp. 984-985.

¹⁵⁹ See IPCC (2007), p. 882 for more details.

Based on this figure, the temperature trends in this region of Asia are seriously considerable, as the IPCC projections also predict a rising temperature in the region, which could potentially lead to a very severe drought in the region in upcoming decades. “In the MMD-A1B simulations, central Asia warms by a median of 3.7°C, and Tibet by 3.8°C [...] by the end of the 21st century.”¹⁶⁰ The figure 3.4 highlights the annual mean temperature as well as changes in wet and dry seasons¹⁶¹ in Asia between 1980 to 1999 and 2080 to 2099.

Figure 3.4: temperature changes over Asia between 1980 to 1999 and 2080 to 2099



Source: adapted from IPCC 2007, p. 883

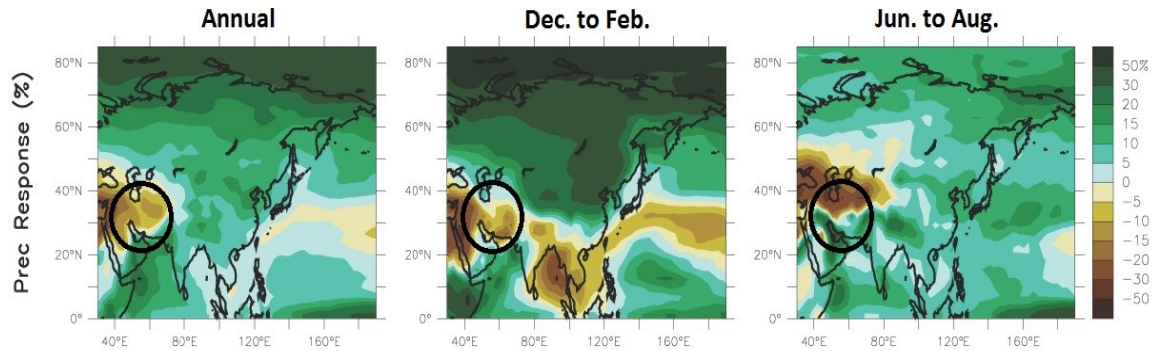
The precipitation changes in Asia are also projected by the IPCC. As the figure 3.5 shows, the precipitation changes projected for 2080 to 2099 reveal that the precipitation level increases in wet season (middle) but, highly, decreases in dry season (right). “The median change by the end of the 21st century is –3% in the annual mean, with +4% in DJF and –13% in JJA.”¹⁶²

¹⁶⁰ See loc. cit., p. 883.

¹⁶¹ *Wet Season* includes the months December, January, and February and *Dry Season* includes June, July, and August.

¹⁶² See loc. cit., p. 887.

Figure 3.5: precipitation changes over Asia between 1980 to 1999 and 2080 to 2099

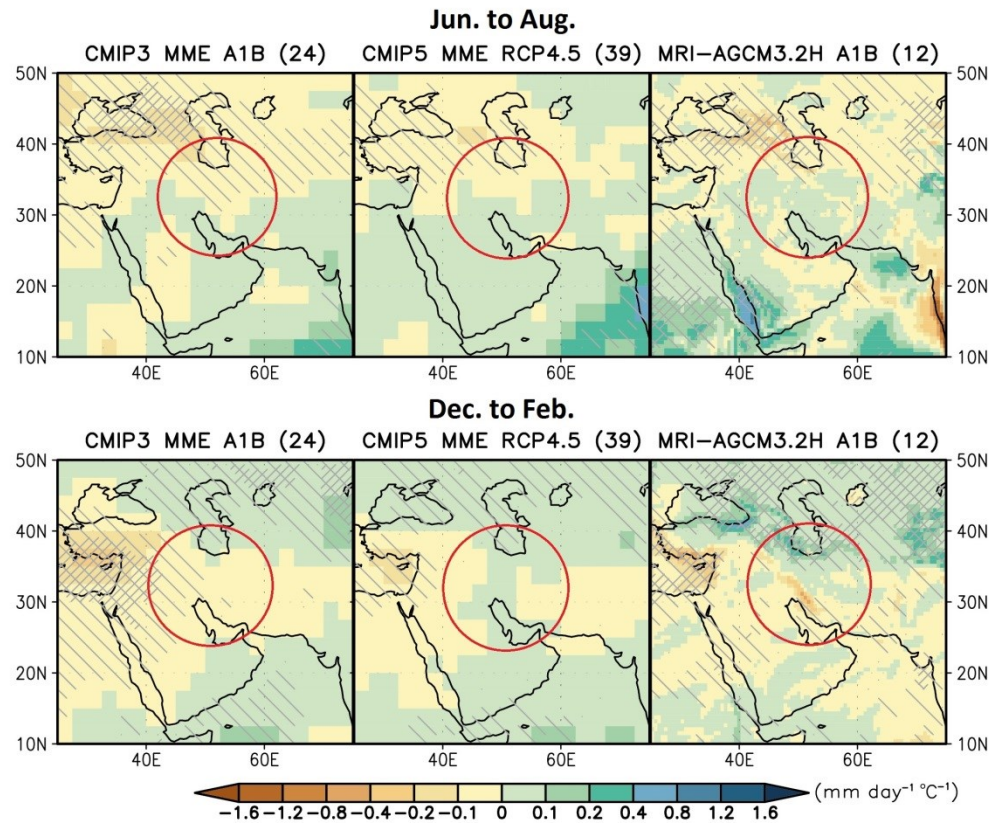


Source: adapted from IPCC 2007, 883

Therefore, the Central and West Asia face less precipitation changes in wet seasons and more changes in dry seasons in the time period of 2080 to 2099 as projected by IPCC. “Model agreement, however, indicates that it is very likely that temperatures will continue to increase. But at the same time, model agreement on projected precipitation changes have reduced, resulting in medium confidence in projections showing an overall reduction in precipitation.”¹⁶³ (see figure 3.6).

¹⁶³ IPCC (2013), p. 1272.

Figure 3.6: precipitation changes in West Asia in 2080-2099, projected based on precipitations in 1986-2005 (Jun. to Aug., above) and (Dec. to Feb., below)



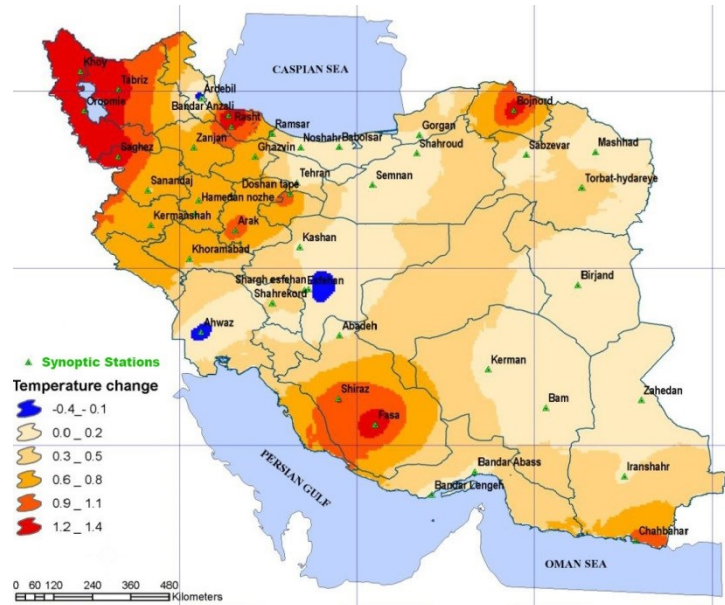
Source: adapted from IPCC 2013, p. 1272

3.5. Climate change impacts on urban regions in Iran

As part of West Asia, many regions in Iran have also been facing droughts and low average precipitation in recent years. This has been one of the most challenging problems pertaining to the water supply in both drink water and agricultural sectors. The climatic changes projected by the *National Climate Change office* of the Iranian department of environment shows that the average temperature increases by $0.5 \text{ } ^\circ\text{C}$ in coming 25 years from 2010 onwards. The precipitation changes projected reveal also that the average precipitation will

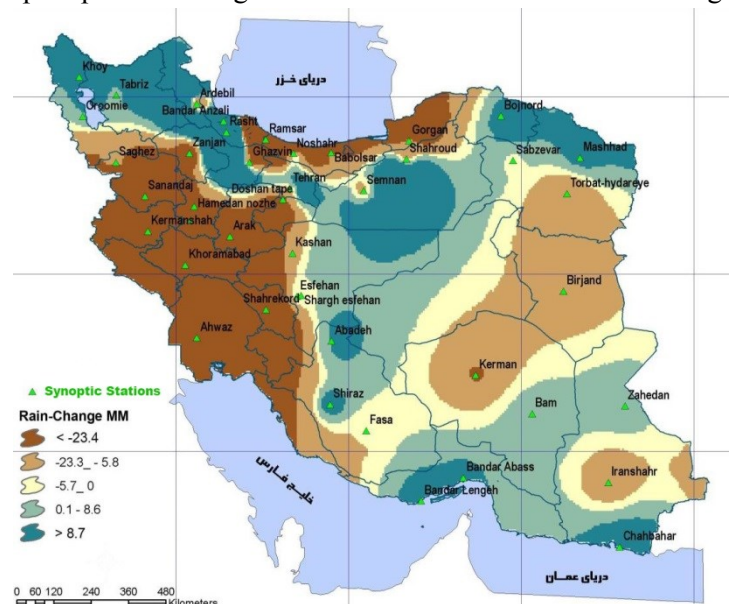
decrease about 10% from 2010 to 2039. In addition, the probability of having heavy rainfalls resulting floods and of droughts and the number of dry days would increase.¹⁶⁴

Figure 3.7: projected temperature changes in Iran for 2010-2039 based on changes from 1976-2005



Source: adapted from Soltanieh, M. (2013), p. 18

Figure 3.8: projected precipitation changes in Iran for 2010-2039 based on changes from 1976-2005



Source: adapted from Soltanieh, M. (2013), p. 19

¹⁶⁴ See Soltanieh, M. (2013), p. 20.

Although the average yearly precipitation has been declining in recent decades, there have been seasonal heavy rainfall and flash floods in many urban regions in the country, which match some of the indicators of climate change and global warming. The table 3.1 highlights some of the torrential rainfalls causing devastating flash floods in the cities across the country in recent years.

Table 3.1: urban areas witnessing torrential rainfall and flood in Iran in the last five years

City/Region	Flood on:
Nur County – Northern Iran	07.11.2011
Behbahān City – Southern Iran	23.11.2011
Tehran City – Central to the Northern Iran	15.04.2012
North K̄orāsān – Northeastern Iran	19.06.2012
Ardebil and K̄alkāl – Northwestern Iran	25.06.2012
Rašt and Fuman – Northern Iran	24.09.2012
Behšahr City – Northern Iran	13.10.2012
Western Māzandarān – Northern Iran	11-12.11.2012
Bušeher City – Southern Iran	24.11.2012
Bandar ābbās – Southern Iran	27.03.2014
Sāri City – Northern Iran	04.06.2014
Nekā County – Northern Iran	04.06.2014
Semnān Province - Central to the Northern Iran	04.06.2014

Source: self-collected information

3.6. Energy efficiency and climate protection

Climate change is the direct outcome of fossil fuel combustion in all energy consumption sectors producing CO₂ and emitting it into the atmosphere. The first resolution to protect the climate from more changes is, then, to reduce the use of fossil energies in different scales and enhance the energy efficiency in all energy consumption types because the “efficient use of existing supplies is widely acknowledged as the fastest, cheapest, and cleanest way to meet future energy needs.”¹⁶⁵ Energy efficiency as a broad concept includes the methods of energy conservation, technical structures and facilities for using energy efficiently in all sectors, and social and physical infrastructures promoting the efficiency of energy usage.

The production and consumption of clean and renewable energies are also to be undertaken to enable the energy world to shift to more sustainable energy sources and to produce less greenhouse gases. The renewable energies include solar energy and photovoltaics, hydroelectric power, wind energy, geothermal heat, and biofuels.

3.7. Climate adaptive regional development

The role of climate change is getting more significant in planning procedures. The change of climate with its impacts on urban and regional environments has already influenced the directions and goals of many urban planning systems around the world. From the regional planning point of the view, energy efficiency policies must be made and relative tools and actions must be undertaken. The energy consumption types including residential and commercial, industrial, and transportation are tightly interrelated and the role of planning in a multidisciplinary background is a challenging one. The most critical issues in a regional scale include land use designation, transportation, and settlement structure because “the relationship between energy usage, and its related CO₂ emissions, and the settlement and

¹⁶⁵ U.S. Department of State (2009), p. 1.

transportation structure must be analyzed in order to develop regional strategies and approaches.”¹⁶⁶

The climate adaptation strategies in regional plans refer to the approaches recommended for counteracting the impacts of climate change on the regions. These impacts, as mentioned in section 3.4., cause the phenomena such as temperature increase, precipitation decrease and droughts, and the risk of floods in the regions. To recommend holistic approaches in this respect, the vulnerability of the regions in terms of socio-economic and natural environments must be analyzed. This vulnerability analysis enables the planners to understand the direct and indirect impacts of the changing climate on the region and to begin with the most vulnerable elements for protection. The results of the vulnerability analysis, then, could also be fed into the future regional plans for that specific region. As an example, the vulnerability analysis and respective recommendations are represented in chapter 5 for the Westsachsen Region in Germany.

¹⁶⁶ Schmidt, C., Seidel, A. et al (2011), p. 166.

3.8. Energy efficiency and environmental protection in Iran

3.8.1. Introduction

Iran as an oil producing country has a long and complex history on oil industry from the discovery to the international trade. The first attempts at discovering the oil in south of Iran were made in 1880s, in Qājār era, by foreign companies. The *Houts Company* and the *Reuter Corporation* were the first contractors who tried to excavate and discover the oil in Iran.¹⁶⁷ The third concession was granted to *William Knox D'Arcy*, a British trader, in 1901 to start the excavations in west and southwest of Iran. Those efforts were partly successful and found the first oil reserves in Qaşre Širin in the west, which were not considerable.¹⁶⁸ The next project were run in the south and was fruitful, as it made the first spout of oil shot out in the excavation site in Masjed Soleymān in 26. May 1908.¹⁶⁹ In 1909, D'Arcy and his partners established the *England and Iran Oil Company* to develop the discovery projects in Masjed Soleymān and to build up pipelines and the first refinery station of Iran in Ābādān.¹⁷⁰ Later on, the company and the government of Iran reviewed the contract in 1933 and the company committed itself to providing Iran with technical advice pertaining to railway network development and cement production.¹⁷¹ Between 1935 and 1947, the oil industry of Iran was a highly competitive business among American, British, and Russian companies and each company tried to get better concession.

In 1951, the 16th national parliament of Iran passed the bill, prepared by the oil commission of the parliament, on nationalizing the oil industry of Iran and authorized the government to run all necessary actions to discover, excavate, and exploit the oil throughout the country.¹⁷² But the British government was against the nationalization of the oil industry and during the political changes within the Iranian government in next three years tried to reclaim the contract of 1933. The two coups in 1953 were the most important political

¹⁶⁷ See Rasekhi Langroudi, A. (2007), pp. 15-16 for more details.

¹⁶⁸ See loc. cit., pp. 38-39 for more details.

¹⁶⁹ See loc. cit., pp. 46-47 for more details.

¹⁷⁰ See loc. cit., p. 54 for more details.

¹⁷¹ See loc. cit., p. 90 for more details.

¹⁷² See loc. cit., p. 158 for more details.

events in Iran, conducted by the United States and England.¹⁷³ In 1954, the 18th national parliament ratified the law on sale of oil and gas under a contract between government and the *International Consortium for Oil* including five American corporations, British Petroleum Company, Royal Dutch Shell, and the French oil company.¹⁷⁴ The wave of criticism arose after the consortium did not fulfill its obligations. So, the next contract between National Iranian Oil Company (NIOC) and the consortium was concluded in 1973 in Saint Moritz.¹⁷⁵

In order to rule the oil reserves and to reserve the right to govern all activities in this respect for the national oil company, the national parliament passed the first law on oil and its relative industries in 1957 – three years after the first contract with the consortium.¹⁷⁶ This law legitimated the national oil company to possess all oil resources throughout the country and obliged it to preserve one third of the known resources as a national treasure. According to this law, the foreign contractors were obliged to accept the fifty-fifty benefit conditions with the national Iranian oil company and pay an additional tax of 50 percent on their profit to the government of Iran.¹⁷⁷ This law was reviewed in 1974 and the role of foreign companies was lessened to the participation in discovery activities.

After the Islamic revolution in 1979, the Ministry of Petroleum (MOP) was established and took the responsibility for managing the oil discoveries and exploitation, oil refineries, and oil exports with its subsidiary companies. This ministry has an average yearly share of 28 percent in GDP, 84 percent in foreign exchange revenues, and more than 95 percent in primary energy production in the country.¹⁷⁸

Currently, the major energy carriers in Iran include Petrol, Gasoline, LPG, CNG, Natural Gas, Kerosene, Mazut, and Electricity. The replacement of pollutant fossil fuels with

¹⁷³ See loc. cit., p. 243 for more details.

¹⁷⁴ See loc. cit., pp. 257-258 for more details.

¹⁷⁵ See loc. cit., p. 268 for more details.

¹⁷⁶ See loc. cit., pp. 271-272 for more details.

¹⁷⁷ See loc. cit., pp. 273-274 for more details.

¹⁷⁸ Adapted from the official homepage of the ministry of petroleum, at <http://www.mop.ir/Portal/Home/ShowPage.aspx?Object=Event&ID=0571dd3c-0b85-4381-b294-89b02a38d009&LayoutID=63343e70-4d2d-424a-8232-64746f58279a&CategoryID=4bd7d587-34c9-4985-9d2a-2b724685e2b9> on 19.01.2015.

cleaner energy carriers has been one of the most important policies run by the MOP in the last 30 years. This part of the current chapter reviews the national regulations and policies set to reduce the CO₂ emissions as well as the internal guidelines of the actor organizations in energy production, energy distribution, urban development, and transportation management sectors to highlight how those actors contribute to the process of energy transition. The author of this study's aim was to mention only the regional regulations focusing on the environment and the climate here, but most of these regulatory features are not regional but national, and working also regionally.

3.8.2. Constitutional framework for energy efficiency and environmental protection

3.8.2.1. Constitution of the Islamic Republic of Iran

Article 50 of the constitution of the Islamic Republic of Iran recognizes the conservation of environment as a public duty and bans the economic activities which pollute the environment or destroy it.¹⁷⁹

3.8.2.2. Protection and Enhancement of the Environment Act of 1974

According to the protection and enhancement of the environment act of 1974 and its review of 1992, the “department of environment”¹⁸⁰ (DOE) is the organization in charge of protection of environment from the pollution and any other destructive activity unbalancing the ecosystems. Table 3.2 highlights the major tasks of the department of environment based on this act.

¹⁷⁹ See Constitution of the Islamic Republic of Iran (1979), article 50 for more details.

¹⁸⁰ *The “department of environment” is a dependent organization to the presidency and works under the supervision of “high council of the environmental protection”. The president is the chief of the council and the council includes the ministers of agriculture Jihad, interior, industries and mines, roads and urban development, health and medical education, chief of plan and budget organization, and chief of department of environment. Protection and enhancement of the environment act 1974, article 2.*

Table 3.2: major tasks of the department of environment based on the protection and enhancement of environment act of 1974

<p>Protection and enhancement of environment act of 1974</p>	<p>Article 6:</p> <p>A: doing scientific and economic research on protection and enhancement of the environment and preventing the environment from pollution and from getting unbalanced,</p> <p>B: preparing bills to conserve the water, air, and soil from all the pollutants,</p> <p>C: taking any action to enhance the environment in the framework of national laws with respect to rights of individuals, and</p> <p>D: carrying out educational public programs on protection of environment.</p> <p><i>“Article 7: if the department of environment recognizes that the implementation of any development plan or exploitation of them is harmful to the environmental laws, it informs the ministry or the related institution responsible for the plan in order to try to review the plan with the help of other related organizations.”</i></p>
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Source: adapted from the protection and enhancement of environment act of 1974¹⁸¹

3.8.2.3. The five-year economic, social, and cultural development plans

The five-year development plans in Iran are considered as the roadmap for all activities run by the governmental sectors in a particular target five years. A five-year development plan usually conceptualizes and regulates governmental, socioeconomic, cultural, and environmental issues, based on which all sectoral governmental organizations act. The first

¹⁸¹ The texts in “*Italic*” have been directly quoted and the rest have been adapted from the protection and enhancement of environment act of 1974.

five-year plan was ratified on 1989 and the fifth five-year plan is currently under consideration.

It was first in the 2nd five-year plan of 1995 that the environmental and energy related issues got attention. The 3rd and 4th plans completed the story more in details and the 5th plan put emphasis also on clean and renewable energy sources. Tables 3.3 to 3.6 highlight the contents of those plans, related to the environmental and energy issues.

Table 3.3: energy and environment-related issues in the 2nd 5-year development plan in Iran

5-year development plan	Selected contents
<p>The 2nd 5-year plan</p>	<p><i>“Basic guideline 10: Conservation of the environment and efficient utilization of country’s natural resources through:”</i></p> <ul style="list-style-type: none"> - Emphasis on appropriate conservation, revitalization, development, and exploitation of natural resources, - Setting environmental regulations and indicators, - Reforming constitutional and legal frameworks, - Efficient use of energy through changing consumption patterns, and using clean and renewable energies, and - Conserving and developing green environment, preventing the soil, the air, and the water from pollution.

Source: adapted from the second socio-economic and cultural development plan of the Islamic Republic of Iran 1995-1999¹⁸²

¹⁸² The texts in *“Italic”* have been directly quoted and the rest have been adapted from the 2nd Socio-economic and Cultural Development Plan of the Islamic Republic of Iran 1995-1999.

Table 3.4: energy and environment-related issues in the 3rd 5-year development plan in Iran

5-year development plan	Selected contents
<p>The 3rd 5-year plan</p>	<p>Environmental policies</p> <p><i>“Article 104: In order to conserve the environment and to sustainably exploit the country’s natural resources, the following items should be implemented:”</i></p> <ul style="list-style-type: none"> - All manufacturing units must adapt their technical facilities to the environmental regulations and codes to decrease the environmental pollutants, - The government is obliged to decrease air pollution in large cities e.g. Tehran, Mašhad, Tabriz, Ahvāz, Arāk, Širāz, and Ešfahān to the standards of world health organization, - Manufacturing units within the urban areas should be relocated, - All public sectors should repair their polluter vehicles, - Municipality of Tehran is obliged to repair its polluter public transport vehicles and buses, and - Taxi and minibus license extensions are conditional upon their having no technical defects resulting air pollution, <p><i>“Article 105: all mass production and service projects must, prior to the implementation and in their feasibility studies, be assessed from the viewpoint of their impacts on the environment based on the guidelines proposed by the high council of environment and ratified by the cabinet.”</i></p>

	<p>Energy sector policies</p> <p><i>“Article 121: in order to save energy and to reduce and rationalize the energy consumption to protect the environment, the government is required to take the following measures:”</i></p> <ul style="list-style-type: none"> - Preparing technical standards regarding energy consumption for products, equipment, processes, and energy consuming systems, - Preparing a by-law to govern the working hours of the guilds especially in peak seasons of electricity consumption, - Regulating seasonal working hours for manufacturing units to reduce the energy consumption in peak season months, - Drawing up energy standards and codes for buildings design and construction in both governmental and non-governmental sectors to reduce waste of energy, and - Designing incentive policies for the existing buildings which could be adapted to the energy consumption standards.
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Source: adapted from the third socio-economic and cultural development plan of the Islamic Republic of Iran 2000-2004¹⁸³

¹⁸³ The texts in *“Italic”* have been directly quoted and the rest have been adapted from the 3rd Socio-economic and Cultural Development Plan of the Islamic Republic of Iran 2000-2004.

Table 3.5: energy and environment-related issues in the 4th 5-year development plan in Iran

5-year development plan	Selected contents
<p>The 4th 5-year plan</p>	<p><i>“Article 60: in order to strengthen and enable the entities concerned with the environment and natural resources, government is charged with devising necessary mechanisms for expansion of the specialized environmental public education in all the educational units and higher education centers, promote and protect investment in the environmental and natural resources sector, and create and enable proper entities for environmental activities in the agencies affecting the environment.”</i></p> <p><i>“Article 62: Government is bound to:</i></p> <ul style="list-style-type: none"> <i>A. Reduce air pollution of the cities of Tehran, Ahvāz, Arāk, Tabriz, Mašhad, Širāz, Karaj, and Ešfahān to the level of the standards approved by the high council of environment protection.</i> <i>B. Take measure in order to dispose all the country’s run down motor vehicles and motorbikes.”</i> <p><i>“Article 64: the department of environment is bound to:</i></p> <ul style="list-style-type: none"> <i>A. Prepare the executive by-laws concerning sustainable development in line with enhancing public knowledge of environment protection, [...]. All the pertinent agencies, government media and the Islamic Republic of Iran Broadcasting Organization are bound to implement educational programs subject of this Article, free of charge.</i> <i>B. Create the country’s environmental information system at</i>

	<i>the national, provincial, and regional levels by the end of the first year of the fourth plan in order to prepare the ground for environmental monitoring, information dissemination and evaluation. All the relevant agencies are bound to cooperate in designing and implementation of the system.”</i>
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Source: adapted from the fourth socio-economic and cultural development plan of the Islamic Republic of Iran 2005-2009¹⁸⁴

Table 3.6: energy and environment-related issues in the 5th 5-year development plan in Iran

5-year development plan	Selected contents
The 5th 5-year plan	<p><i>“Article 133: in order to diversify the country’s energy market, to make the power plants more efficient, to decrease energy waste as well as to develop simultaneous production of electricity and heat, Tavaanir Company and other companies belonging to the Ministry of Energy are required to:”</i></p> <ul style="list-style-type: none"> - purchase the electricity produced by clean and renewable energy sources through long-term contracts from private producers with the priority, - support the small scale power plants in private sector, and - increase energy costs of those consumers whose annual use of energy is over 2000 m³ of fuel oil or over 2 Megawatt of electricity. <p>Article 134: the Ministries of Energy and Industries and Mines are allowed to grant financial incentives to support the energy saving</p>

¹⁸⁴ The texts in “*Italic*” have been directly quoted and the rest have been adapted from the 4th Socio-economic and Cultural Development Plan of the Islamic Republic of Iran 2005-2009.

	<p>manufacturers and users in order to reform the consumption patterns for more energy efficiency.</p> <p>Article 139: in order to create the infrastructures needed to produce equipment for wind and solar power plants, the government is allowed to support private sectors and cooperatives.</p> <p><i>“Article 192: in order to decrease the pollutant and damaging items to the environment, all manufacturing, industrial, developing, service and infrastructural units are required to: ”</i></p> <ul style="list-style-type: none"> A. Assess their environmental impacts according to the guidelines of the high council of environment, B. Sample and test their pollution to the environment and report it to the department of environment, and C. Upgrade their technical specifications to the level of environmental standards. <p><i>“Article 193-B: the department of environment is required to take necessary measures to decrease the air pollution to the level of global standards with given priority to the particle diffusing sources to control them, and to decreasing greenhouse gases.”</i></p>
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Source: adapted from the fifth socio-economic and cultural development plan of the Islamic Republic of Iran 2011-2015¹⁸⁵

Comparing aforementioned four development plans shows that the 3rd plan is the first comprehensive one in terms of paying attention to both energy efficiency and

¹⁸⁵ The texts in *“Italic”* have been directly quoted and the rest have been adapted from the 5th Socio-economic and Cultural Development Plan of the Islamic Republic of Iran 2011-2015.

environmental issues in national level. The 4th and the 5th plans repeat, more or less, the contents of the 3rd plan and don't add any specific how-to or doable technical solution in details.

3.8.2.4. Expansion and protection of green spaces within the cities act of 1980

This act protects the trees. Based on this act, cutting down any kind of tree in the streets, highways, parks, and in any other places known as gardens, within the city boundaries is forbidden. The municipalities are required to document the number of trees, their species, and their ages in any given place within their official boundaries.¹⁸⁶

3.8.2.5. Prevention of water pollution act of 1994

This act was ratified by the cabinet of ministers in 1994, nullifying the act of 1985 with the same title. This act gives the responsibility of water protection over to the department of environment (Table 3.7).

Table 3.7: tasks given to department of environment by the prevention of water pollution act of 1994

<p>Prevention of water pollution act of 1994</p>	<p>Department of environment is required to:</p> <ul style="list-style-type: none"> - Identify water polluters and pollution sources, - Prepare water pollution standards and implement them, - Regularly Sample the waste and waste water of polluter units to measure their pollution levels,
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Source: adapted from the prevention of water pollution act of 1994

¹⁸⁶ See Expansion and Protection of Green Spaces within the Cities Act (1980), articles 1-2 for more details.

3.8.2.6. Sanitary environment bylaw of 1992

The sanitary environment bylaw of 1992 refers to human environment as a place to live in, and it should be hygienic. It defines the sanitary environment as “controlling those factors of the living environment, which affect the human’s physical, mental, and social health.”¹⁸⁷ The bylaw focuses on the drink water supply, water pollution, hygienic control of public places, food and drink manufacturing units, restaurants, shops, hospitals, schools, etc. and gives the responsibility of the control over to the ministry of health and medical education.

3.8.2.7. Prevention of air pollution act of 1995

This act also recognizes the department of environment as the leading unit in protecting the air against various pollution sources. Three major air polluter sectors have been identified by this act, namely, manufacturing units and power plants, housing and commercial units, and the transportation sector. This act focuses, mostly, on the energy-using units, energy carriers used in each sector as well as upgrading the consumer units to high levels of standards defined by the department of environment (Table 3.8).

Table 3.8: summary of contents of the prevention of air pollution act of 1995

Prevention of air pollution act of 1995	To decrease the air pollution, following measures must be taken into account; In transportation sector: <ul style="list-style-type: none">- Inspecting all motor vehicles once a year,- Planning for traffic and public transport system by the municipalities and other responsible organizations to reduce air pollution, and
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¹⁸⁷ Mansour, J. (2003), p. 1076, sanitary environment bylaw of 1992.

	<ul style="list-style-type: none"> - Producing gas-firing motor vehicles. <p>In industrial sector:</p> <ul style="list-style-type: none"> - Establishing new manufacturing units and relocating the existing ones should be according to the environmental guidelines, - Defining the clean air as well as the air pollutant standards for any given region by the department of environment, - Relocating polluter units if there is no other way to decrease their pollution or if the continuum of their activities endanger the health of inhabitants in neighboring regions, - Allocating min. of 10 percent of the industrial ensembles and units for greening, - Upgrading technical facilities and using clean energy carriers in all units, and - Prioritizing industrial ensembles for gas provision by the ministry of petroleum. <p>In housing and commercial sectors:</p> <ul style="list-style-type: none"> - Using natural gas by all air polluters in commercial and service sectors e.g. hotels, restaurants, etc., - Prioritizing service sector units for gas provision by the ministry of petroleum, and - Carrying out environmental studies when providing the comprehensive, conductive, and improvement plans for cities by the Ministries of Roads and Urban Development and of Interior to ensure environmental considerations in respect to the green and open spaces, land use, and transportation networks.
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Source: adapted from the prevention of air pollution act of 1995

3.8.2.8. Farms and orchards land use act of 1995

The farms and orchards land use act of 1995 addresses the protection of farms and orchards from land use change. According to this act, the ministry of agricultural jihad is in charge of implementing the act. The provincial offices of this ministry are required to establish a commission composed of other provincial administrations including the office for land affairs, roads and urban development organization, provincial department of environment, and a representative of the governorate in each province. This commission is required to take into account the environmental considerations as well as physical and regional development plans in any case of decision making pertaining to the land use change.¹⁸⁸

3.8.2.9. National buildings construction codes

The 19th code of the national buildings construction regulations focuses on thermal insulation and energy saving in new constructions as well as reconstruction and renovation of existing buildings. The 19th code was codified, first, in 1991 and an additional guideline for better implementation of that was prepared in 1999. The 19th code classifies the buildings based on their use, geographic location, energy consumption, and energy saving potentials. It regulates also the external envelop of the buildings as well as heating, cooling, lightening, and ventilation systems installed in a building.¹⁸⁹

3.8.2.10. Reforming energy consumption pattern act of 2011

This act focuses on energy management in all energy consumption sectors. The goal is to manage the energy consumption and to promote the efficiency of the energy usage in all sectors in order sustainably to protect the environment, while the levels of GDP and social

¹⁸⁸ Summarized and adapted from the Farms and Orchards Land use Act of 1995 at <http://rc.majlis.ir/fa/law/show/97858> on 27.06.2014.

¹⁸⁹ See Office for National Construction Codes (2002), p. I-III for more details.

welfare remain intact.¹⁹⁰ This act devolves the responsibility of policy-making in energy sector to the High Council of Energy.¹⁹¹ The standardization of energy consumption and energy equipment, buildings thermal insulation and energy efficiency (code 19), the use of energy in industrial and agricultural sectors, transportation, production and distribution of energy, clean and renewable energies, and awareness raising and education have been included in this act.

3.8.2.11. Transportation development and management of energy consumption act of 2007

According to this act and in order to develop the inner city and regional transportation and to better manage the energy consumption, the government is obliged to improve the transportation services and demand, and to promote the efficient energy consumption and efficient automobile production. The government is permitted to reduce the taxes and duties on imported facilities used for developing public transport systems and railway equipment, and also on imported efficient automobiles such as dual-firing and hybrid cars. The government has also the permission to free land plots for installing CNG stations and to charge the taxes on vehicles based on their pollution classification. The outcome of the implementation of this act should represent an increasing share of public transportation in inner city and regional levels.¹⁹²

¹⁹⁰ See Reforming Energy Consumption Pattern Act (2011), article 1 for more details.

¹⁹¹ *The need for establishing an energy council goes back to the early 1960s in Iran. In 1977, the ministry of energy was pointed to establish a council for energy coordination though it also failed. In 1988, the economy council established a council for energy planning and later on the high council of energy was established, under the supervision of the president deputy, to define energy consumption patterns. In 2001, the Islamic parliament ratified an act to assign the government to constitute the high council of energy with the management and planning organization of Iran as its secretariat, but it has also failed to establish the council so far.* Mehrazma, I. (2006), pp. 1-5.

¹⁹² Summarized and adapted from the Transportation Development and Management of Energy Consumption Act of 2007 at <http://hamsu.ir/Portal/Home/Default.aspx?CategoryId=9ff7571a-b79c-40eb-999d-00747f8b68ac> on 07.08.2014.

3.8.2.12. General policies, in transportation and energy sectors, set in 2001

The general policies in transportation and energy sectors focus mostly on the development of clean energy sources as well as the transportation facilities and networks. According to those policies, in energy sector, the efficiency of energy usage must be improved and the volume of fossil fuel consumption must be decreased. The renewable energies must also be developed with given priority to the hydroelectric power in order to protect the environment. The improvement of other clean and renewable energies e.g. wind, solar, nuclear, and geothermal heat must also be taken into account. In transportation sector, an integrated transport system should be developed with given priority to the railway networks. The goal is to safeguard the economic and environmental considerations and to achieve the security and energy efficiency standards in transportation sector.¹⁹³

3.8.3. Actor organizations in energy efficiency and environmental protection issues

Actor organizations in energy and energy efficiency issues in both national and provincial levels have been listed in table 3.9. The major goal of listing those public and private bodies is to review their internal regulations and tasks in order to highlight their positions in the whole topic of energy efficiency in regional and provincial levels. Listing the actors in this respect helps also to better understand the multiplicity of engaged sectors working in this area.

Based on the central management and the provincial division systems in Iran, the actor organizations in national level include the ministries, national units, and head offices, governing their internal affairs according to the constitutional frameworks defined by the lawmakers through canalizing the policies to their provincial and local representative units.

¹⁹³ Summarized and adapted from the General Policies, in transportation and energy sectors, set in 2001 at <http://hamsu.ir/Portal/Home/Default.aspx?CategoryID=0969601e-baf2-4dd2-970d-bea94a7bb068> on 07.08.2014.

Table 3.9: actor organizations in energy efficiency-related issues in national and provincial levels¹⁹⁴

Actor organization in national level	Sub organizational and provincial units	Themes of internal guidelines and missions
Ministry of Interior	Tehran Municipality and the Municipalities of all counties in Tehran Metropolitan Region	<ul style="list-style-type: none"> - Cooperating with the department of environment to implement the article 20 of the protection and enhancement of environment act of 1974,¹⁹⁵ - Hygienically collecting, transporting, and recycling of the wastes,¹⁹⁶ - Informing the planners and building constructors about the article 5 of the prevention of water pollution act of 1994 when preparing urban development plans and issuing construction permits,¹⁹⁷ - Creating motor inspection centers and cooperating with department of environment and the traffic police to manage the transport system,¹⁹⁸ - Documenting the number of trees, their species, and their ages in any given place within their official boundaries based on

¹⁹⁴ All translations of names and titles of organizations have been taken from their official websites and homepages by the author of this study.

¹⁹⁵ According to the article 20 of this act, the department of environment could entrust the municipality of a given place, within which a polluter manufacturing unit is running, to deal with that unit in terms of stopping their activities or making them fix the problem. See article 20 of the protection and enhancement of environment act of 1974 for more details.

¹⁹⁶ See Mansour, J. (2003), p. 1079, rider of the article 10 of sanitary environment bylaw of 1992 for more details.

¹⁹⁷ See loc. cit., p. 1084, article 13 of the prevention of water pollution act of 1994 for more details.

¹⁹⁸ See loc. cit., pp. 1086-1087, articles 5-7 of the prevention of air pollution act of 1995 for more details.

		the expansion and protection of green spaces within the cities act of 1980, ¹⁹⁹
	Center for traffic control in Tehran municipality	<ul style="list-style-type: none"> - Providing traffic information for drivers to choose a better route, - Efficiently using the streets, roads, etc., - Increasing the traffic security, - Decreasing the fuel consumption and environmental pollutions, and - Establishing an integrated traffic management system.²⁰⁰
	Tehran urban and suburban railway operation company	<ul style="list-style-type: none"> - Helping to protect the environment²⁰¹
Ministry of Energy	Tehran regional electric energy distribution company	<ul style="list-style-type: none"> - Producing and distributing electric energy in a sustainable way, - Conserving the energy sources and preventing them from the waste, and - Paying attention to the environmental aspects of energy sources.²⁰²
	Tehran regional electric company	<i>“Mission statement: providing safe, sustainable, far-reaching, and economic electric energy based</i>

¹⁹⁹ See loc. cit., pp. 1136, article 2 and its rider in the expansion and protection of green spaces within the cities act of 1980 for more details.

²⁰⁰ Adapted from the official homepage of the center for traffic control in Tehran municipality, at <http://trafficcontrol.tehran.ir/Default.aspx?tabid=84> on 13.08.2014.

²⁰¹ Adapted from the official homepage of Tehran urban and suburban railway operation company, at <http://metro.tehran.ir/> on 22.07.2014.

²⁰² Adapted from the official homepage of Tehran regional electric energy distribution company, at <http://www.tvedc.ir/statics/OrganizationMissionStatement.aspx> on 24.07.2014.

		<p><i>on environmental requirements and user satisfaction.</i>”²⁰³</p> <ul style="list-style-type: none"> - Establishing environmental management systems in all sectors of the company, - Taking into account the environmental issues in all projects with the contractors, - Grading and supporting contractors and implementing units following the guidelines of the 4th 5-year development plan.²⁰⁴
	Tehran Province water and wastewater	<p><i>“Mission statement:</i></p> <p><i>A. Supplying equal, continuing, and sustainable sanitary drink water for all residents of Tehran Province, and</i></p> <p><i>B. Promoting public sanitation through collecting and treating wastewater by taking the environmental considerations into account and making use of updated technologies.</i>”²⁰⁵</p> <ul style="list-style-type: none"> - Public education in order to reform the water consumption patterns,²⁰⁶ - Energy management and enhancement of

²⁰³ Taken from the official homepage of Tehran regional electric company, at <http://www.trec.co.ir/Default.aspx?PageContentID=939&tabid=4240> on 24.07.2014.

²⁰⁴ Adapted from the official homepage of Tehran regional electric company, at <http://www.trec.co.ir/Default.aspx?PageContentID=942&tabid=4240> on 24.07.2014.

²⁰⁵ Taken from the official homepage of Tehran water and wastewater company, at <http://www.tpww.co.ir/fa/pl/mamoriyat> on 24.07.2014.

²⁰⁶ Adapted from the official homepage of Tehran water and wastewater company, at <http://www.tpww.co.ir/fa/pl/ahdaf> on 24.07.2014.

		energy efficiency, ²⁰⁷
	Tehran regional water company	<ul style="list-style-type: none"> - Providing drink water, water for irrigation, and water for industrial and service units while heeding the environmental aspects, - Controlling surface water to prevent flash floods and flooding, - Conserving the water resources and monitoring the polluters, - Reforming water consumption patterns in all sectors, and - Running educational public programs for conserving water resources and reforming water consumption.²⁰⁸
Ministry of Petroleum	National Iranian oil company	<ul style="list-style-type: none"> - Managing energy consumption to reduce the consumption and to make the use of energy more efficient,²⁰⁹ and - Taking the environmental issues into account through the Health, Safety, and Environment (HSE) system.²¹⁰
	National Iranian oil	<ul style="list-style-type: none"> - Educating the workers based on HSE

²⁰⁷ Adapted from the official homepage of Tehran water and wastewater company, at http://www.tpww.co.ir/abfa_content/media/image/2014/03/28431_orig.pdf on 24.07.2014.

²⁰⁸ Adapted from the official homepage of Tehran regional water company, at <http://www.thrw.ir/Portals/0/rahbord1.pdf> on 24.07.2014.

²⁰⁹ Adapted from the official homepage of the ministry of petroleum, at <http://www.mop.ir/Portal/Home/Default.aspx> on 29.07.2014.

²¹⁰ Adapted from the official homepage of the national Iranian oil company, at <http://www.nioc.ir/portal/Home/ShowPage.aspx?Object=GeneralText&ID=6cd9aa17-3122-437d-b470-d5058131f75c&LayoutID=434e06e5-ac33-4c53-8c59-bcd473f7f0ab&CategoryID=d7d95987-15cb-4032-9f2a-be66a31b0c38> on 29.07.2014.

	refining and distribution company	management system, and - Defining environmental standards and monitoring the projects for their environmental impacts. ²¹¹
	National Iranian gas company	- Replacing fossil fuel with natural gas up to 70 percent in country's energy basket, ²¹² - Investigating the environmental impacts of the projects run by the company based on HSE and environmental management systems. ²¹³
	Iranian fuel conservation company	- Defining energy efficiency standards, - Making rules and regulations pertaining to the energy efficiency and greenhouse gas reduction, - Raising public awareness through educational and advertising programs, - Providing energy efficiency programs for transportation sector, - Enforcing energy efficiency measures in buildings construction sector, - Supporting industrial units to reach

²¹¹ Adapted from the official homepage of the national Iranian oil refining and distribution company, at <http://www.niopdc.ir/HomePage.aspx?TabID=4632&Site=niopdc&Lang=fa-IR> on 29.07.2014.

²¹² Adapted from the official homepage of the ministry of petroleum, at <http://www.mop.ir/Portal/Home/Default.aspx> on 29.07.2014.

²¹³ Adapted from the official website of the national Iranian gas company, at <http://hse.nigc.ir/Site.aspx?ParTree=1110101812> on 29.07.2014.

		<p>energy efficiency standards, and</p> <ul style="list-style-type: none"> - Energy labeling for industrial products.²¹⁴
Ministry of Industry, Mine, and Trade	Iranian mines and mining industries development and renovation organization	<ul style="list-style-type: none"> - Paying special attention to the environmental protection and energy conservation issues.²¹⁵
	Iran small industries and industrial parks organization	<ul style="list-style-type: none"> - Locating industrial parks with regard to environmental requirements, - Estimating and evaluating environmental impacts prior to the building up of industrial parks larger than 100 ha, - Establishing and using environmental management and clean production systems, - Treating industrial wastewater in industrial parks for reuse, - Controlling air pollution in industrial parks to the environmental standard, - Establishing waste recycling systems, and - Developing green areas inside and around the industrial parks.²¹⁶

²¹⁴ Adapted from the official homepage of the Iranian fuel conservation company, at <http://ifco.ir/english/index.asp> on 31.07.2014.

²¹⁵ Adapted from the official homepage of the Iranian mines and mining industries development and renovation organization, at http://www.imidro.gov.ir/general_content/38.html on 31.07.2014.

	Industrial development and renovation organization of Iran	- Undertaking the sustainable development requirements in all projects. ²¹⁷
	Sub-organizational units in all counties of the region	
Ministry of Roads and Urban Development	Road, housing, and urban development research center ²¹⁸	<ul style="list-style-type: none"> - Making research on renewable energies for buildings, - Designing efficient appliances and utilities in buildings energy sector, - Cooperating in rule-making processes for energy labeling and energy efficiency in the buildings (code 19), - Making research on heat and humidity transfer of the buildings' façade to have more energy efficiency, - Making research on smart buildings and passive housing to reduce energy consumption.²¹⁹
	Iran construction engineering organization	<ul style="list-style-type: none"> - Cooperating in rule-making processes for construction standards, and - Controlling appropriate implementation

²¹⁶ Adapted from the official homepage of the Iran small industries and industrial parks organization, at <http://isipo.ir/?part=menu&inc=menu&id=76> on 31.07.2014.

²¹⁷ Adapted from the official homepage of the Industrial development and renovation organization of Iran, at <http://www.idro.ir/Pages/GeneralPages/Targets.aspx> on 31.07.2014.

²¹⁸ The former title of this center was Building and Housing Research Center (BHRC). After the two ministries of “road and transportation” and “housing and urban development” merged, the title of this center was also changed.

²¹⁹ Adapted from the official homepage of road, housing, and urban development research center of Iran at <http://www.bhrc.ac.ir/portal/Default.aspx?tabid=1369> on 30.07.2014.

		of the construction regulations and codes. ²²⁰
	National land and housing organization of Iran	Organizing the activities of the ministry of roads and urban development in: <ul style="list-style-type: none"> - Land use planning, land provision, and land management, and - Housing sector in the framework of housing comprehensive plan and the government's housing policies.²²¹
Ministry of Science, Research, and Technology	Iranian research organization for science and technology	- Supporting the research and the development of technologies in national level, including in new and renewable energies sectors. ²²²
	Materials and energy research center	- Developing applied sciences and technologies in materials and energy issues, and <ul style="list-style-type: none"> - Carrying out higher education programs in materials and energy related subjects.²²³
Ministry of Education	Tehran head office of education, and The head offices of	- Providing better education to Improve living conventions and patterns to a hygienic and environmental-friendly

²²⁰ Adapted from the official homepage of Tehran construction engineering organization, at <http://www.tceo.ir/pdf/nezamnamehmemari920819.pdf> on 04.08.2014.

²²¹ Adapted from the official homepage of the national land and housing organization of Iran at <http://www.nlho.ir/index.aspx?fkeyid=&siteid=1&pageid=132> on 06.08.2014.

²²² Adapted from the official homepage of the Iranian research organization for science and technology, at <http://www.irost.org/goals> and also at <http://www.irost.org/mavad/node/52> on 06.08.2014.

²²³ Adapted from the official homepage of the materials and energy research center of Iran, at <http://portal.merc.ac.ir/intro.aspx> on 06.08.2014.

	education in all counties in Tehran Metropolitan Region	<p>level,</p> <ul style="list-style-type: none"> - Teaching the youth how to treat with the natural and urban environment and how to conserve them, - Defining the consumption patterns and contriving preventive solutions to avoid waste of resources,²²⁴ and - Taking into account the values of the natural and urban environment to reach the sustainable development goals while providing the educational materials.²²⁵
The Presidency (Cabinet of Ministers)	Transportation and fuel management headquarters	<ul style="list-style-type: none"> - Implementing the transportation development and management of energy consumption act of 2007, - Making researches on transportation and energy sectors, - Receiving suggestions from the cabinet and preparing them for the ratification, - Preparing annual budgetary bills for transportation and energy sectors to reach the goals of above mentioned act of 2007, - Collecting statistics in both sectors for

²²⁴ See Šorāye (āliye Enqelābe Farhangi (2001), pp. 5, 8, and 21 for more details.

²²⁵ See High Council of Education (2002), p. 61 for more details.

		publishing, and - Coordinating the activities of all public units related to the transportation and energy sectors. ²²⁶
High Council of Environment	National committee for sustainable development	<ul style="list-style-type: none"> - Coordinating socioeconomic development programs in regard to environmental protection and agenda 21, - Preparing strategic sustainable development framework bill to pass to the high council of environment, - Establishing a data bank regarding the agenda 21 as well as the international conventions on climate change, and - Evaluating the implemented projects regarding environmental policies already made.²²⁷
	Iranian department of environment (DOE)	<p><i>Department of environment:</i></p> <ul style="list-style-type: none"> - Implementing the article 50 of the national constitution on environmental protection, - Protecting the natural ecosystems and preventing the environment from the pollution,

²²⁶ Adapted from the official homepage of the transportation and fuel management headquarters, at <http://hamsu.ir/Portal/Home/Default.aspx?CategoryID=7da34948-23d8-42be-8997-898358fd3848> on 08.08.2014.

²²⁷ Adapted from the urban management information center's homepage, at http://www.umic.ir/index.php?option=com_content&view=article&id=1978:&catid=265:National-Committee-for-Sustainable-Development&Itemid=304 on 12.08.2014.

		<ul style="list-style-type: none"> - Estimating the environmental bearable capacities for exploitation and continuous monitoring of the use of resources, - Making research on environmental pollutants including wastes, chemical fertilizers, and pesticides in water, air, and soil, - Locating the industries, power plants, agricultural fields, and human settlement, and - Promulgating the use of environmental friendly technologies.²²⁸ <p><i>Deputy of human environment – national center for air and climate change:</i></p> <ul style="list-style-type: none"> - Setting strategies in three sectors of air, noise, and energy, - Making research on the use of new air technologies to stop the diffusion of pollutants, - Setting the regulations and standards for vehicles and industrial units and monitoring the implementation of motor vehicle technical inspection, and
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²²⁸ Adapted from the official homepage of Iranian department of environment, at <http://www.doe.ir/Portal/home/?147077/> on 12.08.2014.

		<ul style="list-style-type: none"> - Cooperating with international parties on conventions and protocols.²²⁹ <p><i>National document on environment:</i>²³⁰</p> <ul style="list-style-type: none"> - <i>Mobilizing society's sociocultural and mental capacities to protect the environment,</i> - <i>Developing scientific and technological capacities to support the sustainable development and the science-oriented management of environmental processes,</i> - <i>Establishing a constructive integration and interaction between economy and environment for the sake of sustainable development of the society,</i> - <i>Controlling and monitoring the quality of air in the country to reach the clean and fresh air,</i> - <i>Efficiently managing the quality and quantity of underground and surface water resources as well as the seas and water basins on borders,</i> - <i>Efficiently managing the quality and quantity of soil resources,</i> - <i>Managing country's natural landscapes in terms of plants, living species, and</i>
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²²⁹ Adapted from the official homepage of deputy of human environment – national center for air and climate change in Iranian department of environment, at <http://www.doe.ir/Portal/home/?175073/> on 13.08.2014.

²³⁰ Department of Environment (2012), p. 20.

		<p><i>genes in order to protect and improve the living species, and</i></p> <ul style="list-style-type: none"> - <i>Sustainably governing the production and consumption of energy resources.</i> <p><i>Tehran Province department of environment:</i></p> <ul style="list-style-type: none"> - Monitoring and controlling the polluter industrial units to make them take the standards into account, - Sampling and testing the environmental pollutants in urban and industrial areas, - Cooperating with academic and research centers in studies on human environments, - Preparing educational public programs to promote the knowledge of citizens, and - Preparing educational school programs.²³¹
Islamic Republic of Iran Police	Rahvar traffic police	<ul style="list-style-type: none"> - Setting and reviewing the traffic regulations, - Monitoring the implementation of regulations to safeguard the traffic and transportation, - Protecting the roads' frontage and managing the traffic and traffic signs,

²³¹ Adapted from the official homepage of Tehran Province department of environment, at <http://www.tehran-doe.ir/fa/News/Detail/vazayef> on 13.08.2014.

		<ul style="list-style-type: none"> - Inspecting motor vehicles regarding their pollutants, and - Collecting data and statistics for further uses.²³²
Islamic Republic of Iran Broadcasting	National TV and radio channels	<ul style="list-style-type: none"> - Making researches on environmental related topics by the IRIB research center and the training and research department,²³³ and - Making and broadcasting educational programs and advertisements regarding the environment and the use of energy.²³⁴
Public and Private Automobile Companies e.g.	Iran Khodro Industrial Group	<ul style="list-style-type: none"> - Producing gas-firing and dual-firing vehicles, - Producing more efficient and green vehicles, and - Taking into account environmental considerations in manufacturing automobiles.²³⁵
	Saipa Automobile Company	
	Bahman Group	

Source: self-collected information

Reviewing the internal guidelines and missions of responsible organizations in energy and environmental protection sectors shows that all these units are trying to follow the

²³² Adapted from Daily Hamshahri Newspaper Portal, at <http://www.hamshahrionline.ir/details/140090> on 13.08.2014.

²³³ Adapted from the official homepage of the Islamic republic of Iran broadcasting, at http://www.tvr.ir/index.php?option=com_content&task=view&id=9425&Itemid=597 and also at <http://www.rcirib.ir/ch/about.asp> on 13.08.2014.

²³⁴ Concluded by the author of this study through self-observations.

²³⁵ Adapted and concluded based on the information of homepages of aforementioned companies, at <http://www.ikco.com/fa/>, <http://www.bahmangroup.com/about-us/honours>, and at <http://www.saipacorp.com/Portal/Picture/ShowPicture.aspx?ID=0c06dc55-fb82-4d76-8706-0444fa9ae12b> on 13.08.2014.

constitutional frameworks and leading policies in this respect. There are lots of efforts made by these organizations in four major energy consumption sectors, namely housing and commercial, transportation, industrial, and land use planning. Table 3.10 highlights some of those efforts made to reduce the energy usage as well as to produce and use clean and renewable energies and lower the environmental pollutions.

Table 3.10: efforts made to reduce the energy usage in national level

Energy consumption sectors	Housing and commercial sector	Transportation sector	Industrial sector	Land use planning
Activities done in each sector	1. Fossil fuel alternative to natural gas, 2. Awareness raising via media, schools, work places, etc. 3. Increasing energy costs and abolishing governmental subsidies in energy sector, and 4. Constructing new buildings under the energy saving regulations.	1. Replacing run-down motor vehicles, 2. Producing CNG motor vehicles, 3. Vehicle energy labeling, 4. Rationing petrol for public and private vehicles, 5. Inner city traffic zoning, and 6. Developing electric subway and regional railways.	1. Fossil fuel alternative to natural gas, 2. Energy labeling for industrial products, and 3. Tax incentives to upgrading industrial units.	1. Relocating polluter industrial units, 2. Developing more green spaces, and 3. Conserving the existing vacant and green areas.

Source: self-collected information

Figures 3.9 (left) and 3.10 (right): natural gas supply for households in rural (left) and urban (right) areas



Source: self-captured photos

Figure 3.11: insulation of the façade in new buildings according to code 19



Source: self-captured photo

Figures 3.12 (left) and 3.13 (right): CNG bus and CNG taxis; energy transition in public transport in Tehran



Source: self-captured photos

Figures 3.14 (left) and 3.15 (right): rationing petrol with chip cards and regional trains between Tehran and Karaj Cities



Source: self-captured photos

Figures 3.16 (left) and 3.17 (right): vehicle energy labeling and inner city traffic zoning in Tehran

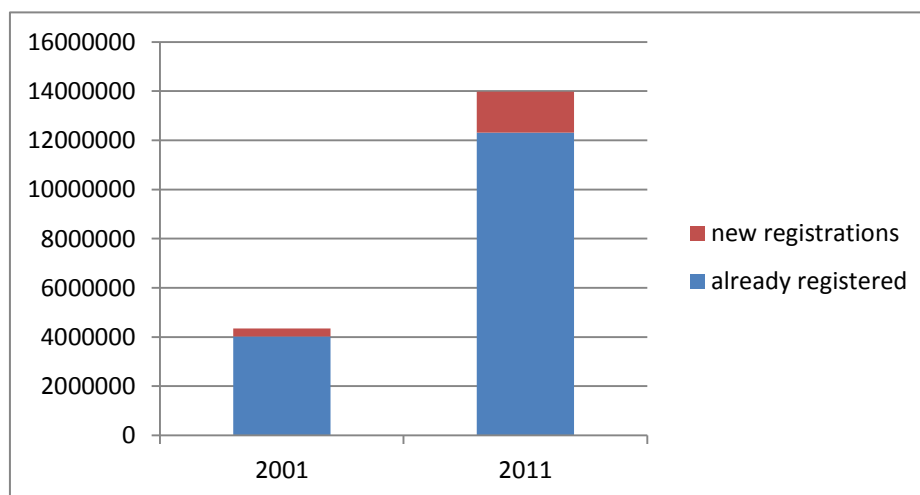


Sources: self-captured photo (left) and adapted from OpenStreetMap 2017 (right)

3.8.4. EE efforts in energy consumption types

Figure 3.24 shows that the CO₂ emission emitted in Iran has almost doubled during 22 years and the figure 3.25 shows that the CO₂ emission per capita has increased about 50% in the same time period. The population growth during these years has been 40%.²³⁶ This figure also reveals that the CO₂ emission per capita has remained almost the same during the last 12 years from 2000 onwards. Whereas, the total number of public and private motor vehicles and cars has increased over three times in whole country during the same period. The figures 3.18 and 3.19 highlight the total number of existing and new registered motor vehicles in 2001 and 2011.

Figure 3.18: registered and total number of public and private motor vehicles in Iran in 2001 and 2011

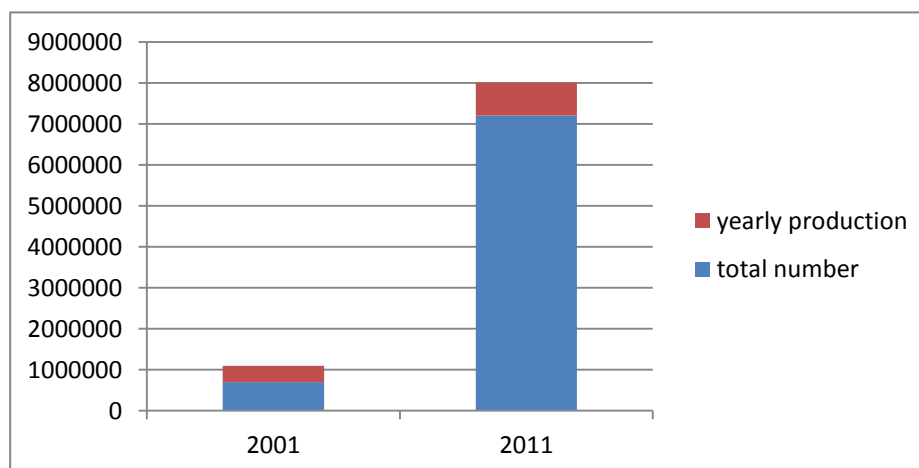


Source: adapted from the SHANA (2014)²³⁷

²³⁶ See PBL (2013), p. 50 for more details.

²³⁷ Petro energy information network (SHANA)

Figure 3.19: produced and total number of motorcycles in Iran in 2001 and 2011

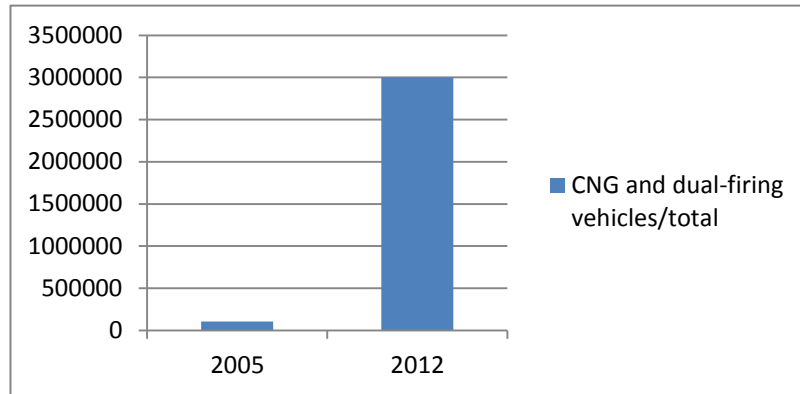


Source: adapted from the SHANA (2014)

As the figures above show, the total number of motor vehicles including public and private cars and motorcycles has crucially increased only in a decade to 2011. In 2011 more than 48% of the oil and fossil energy carriers have been consumed in transportation sector.²³⁸ On the other hand, the total number of CNG and dual-firing vehicles has increased about 30 times from 2001 to 2011 (Figure 3.20) and the number of vehicles per 1.000 populations (Figure 3.21) has almost tripled in the same decade. Therefore, it can be concluded that though the population growth in the last two decades is considerable and there are also a tremendous increase in total number of motor vehicles but the emission per capita in the last 12 years has remained the same (Figure 3.25). This could prove the effectiveness of the policies and regulations on energy efficiency in transportation and industrial sectors.

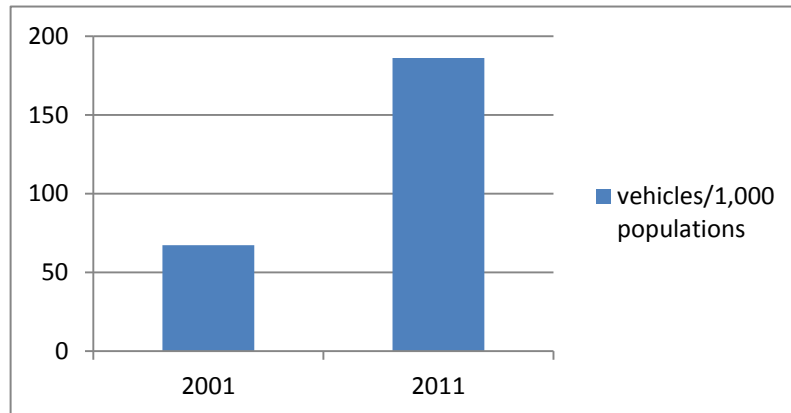
²³⁸ Adapted from Petro energy information network (SHANA) (2014) at <http://www.shana.ir/fa/newsagency/217438> on 06.01.2015.

Figure 3.20: total number of CNG and dual-firing vehicles in 2001 and 2011 in Iran



Source: adapted from Iran Natural Gas Vehicles (2012)²³⁹

Figure 3.21: number of vehicles per 1.000 populations in 2001 and 2011 in Iran



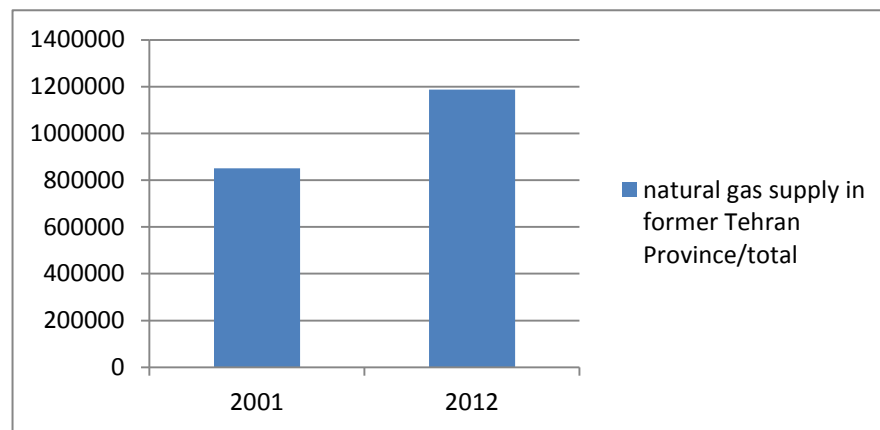
Source: adapted from the SHANA (2014)

Another effective factor on controlling the CO₂ emission per capita in Iran is the natural gas supply for a large number of housing, commercial, and industrial units in urban areas as well as in parts of the rural areas in the whole country. For example, the total number of

²³⁹ Adapted from Iran Natural Gas Vehicles (INGV) homepage at <http://www.ingv.ir/index.php/fa/statistics/production-stat> on 08.01.2015.

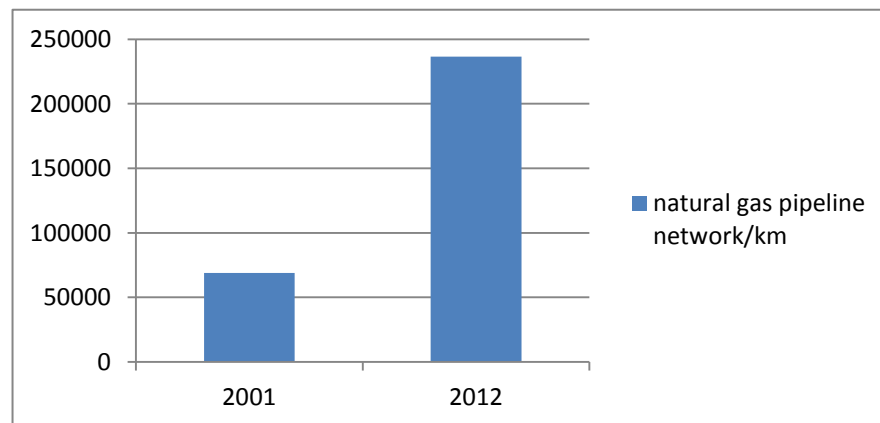
natural gas end-users in 25 towns and 17 rural settlements in former Tehran Province has been 850,121 units in 2001, whereas, this number was about 1,186,710 units in 57 towns and 525 rural settlements in 2012²⁴⁰ in both Tehran and Alborz Provinces (Figure 3.22).²⁴¹

Figure 3.22: total number of residential, commercial, and industrial units with natural gas supply in 2001 and 2012 in former Tehran Province



Source: adapted from Tehran Governorate (2010), p. 260

Figure 3.23: natural gas pipeline network in the country, length/km



Source: adapted from the Ministry of Energy (2013), p. 30

²⁴⁰ In order to make the statistics of the two years of 2001 and 2012 comparable, the statistics of 2012 presented here include both Tehran and Alborz Provinces because in 2001 the whole Alborz Province was part of former Tehran Province.

²⁴¹ See Tehran Governorate (2010), p. 260 for more details.

Also, the figure 3.23 highlights the development of natural gas pipelines throughout the country, which is one of the direct results of national energy policies focusing on the provision of clean energy sources. As the figure shows, the gas pipeline network length has increased more than three times during the last decade to 2012. According to abovementioned facts, the replacement of liquid fossil fuels with natural gas in housing, transportation, and industrial sectors in Iran has been one of the most important steps towards the CO₂ reduction and climate protection.

These facts show that the national regulations have been effective in terms of realizing pragmatic actions in the field of energy transition in a large scale throughout the country and the actor organizations have also followed the law and fulfilled their internal missions. Those organizations define their missions at the national level and run the energy transition projects in very local level e.g. rural, town, and county levels. In other words, the regulations and acts are integrated and are all in the same direction but the implementation of them in terms of planning, tools, and how-to are independent and not necessarily integrated among all responsible bodies. Therefore, the existence of energy efficiency and climate protection policies in a regional plan e.g. for Tehran Region, is hard to prove. The next chapter will review the regional plan for Tehran Region to seek for the energy efficiency and climate relevant policies.

3.9. Conclusions

The climate has already changed and its impacts on the world's urban regions have been recognized long time ago. The global warming and higher mean temperature in many parts of the world together with mean precipitation decrease and droughts endanger the socio-economic and environmental stability in many countries. The severe weather events such as heavy rainfalls and flashfloods are also the share of lots of regions in the world. As the main contributor to this phenomenon, the use of fossil fuel and the production of CO₂ and other GHGs must be reduced in many forms and in all consumption types. Obviously, a higher CO₂ emission in any local or regional unit contributes to the whole system of climate enveloping the world. Therefore, any climate protection plan aiming to remedy the alteration of the climate should consider the whole global climate and to act in a local level while paying attention to the fact that multi-level governance is needed in local and regional levels. This means that not only the vertical and top-down relations in governmental and policymaking bodies must efficiently function, but also a horizontal cooperation among regional and local actors must exist. "As cities and national governments cannot act alone to effectively tackle climate change, a framework for understanding the linkages across multiple levels of government and with the private sector and non-governmental stakeholders is needed."²⁴² The extent to which the multi-level governance is taken into consideration in Iranian regional planning system will be analyzed later in chapter 4 after reviewing the case of Tehran Metropolitan Region Plan.

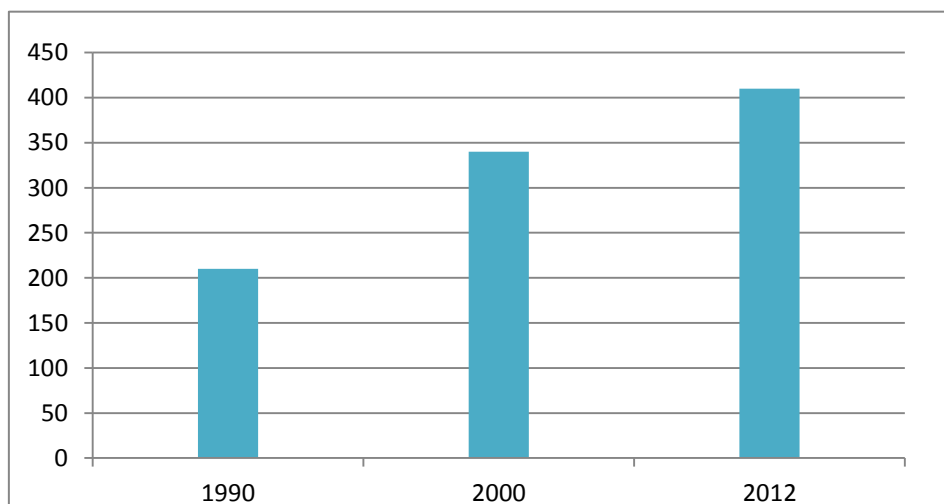
But as of constitutional framework, the legal basis for environmental protection, especially for climate protection through the more efficient use of energy, is highly available in Iran. As presented earlier in this chapter, the acts of prevention of water and air pollution and of protection of green spaces and agricultural lands together with those pertaining to the reformation of energy consumption patterns and construction codes could function as an integrated network of laws and regulations binding the responsible bodies to plan and act in this respect.

²⁴² OECD (2010), p. 171.

Although the number of public sector organizations working on these issues is really high, but they mostly refer their objectives and missions to the fundamental regulations and acts set for action in the national level. Therefore, each organization, depending on its position and duties in the whole system and on its relevance to the issue of energy efficiency and environmental protection, moves towards the targets defined by these rules. Hence, it could be concluded that not only there are enough constitutional bases for these issues in development planning system in Iran but also the public sector organizations are also working in line with the actual and updated legal frameworks provided by the lawmakers.

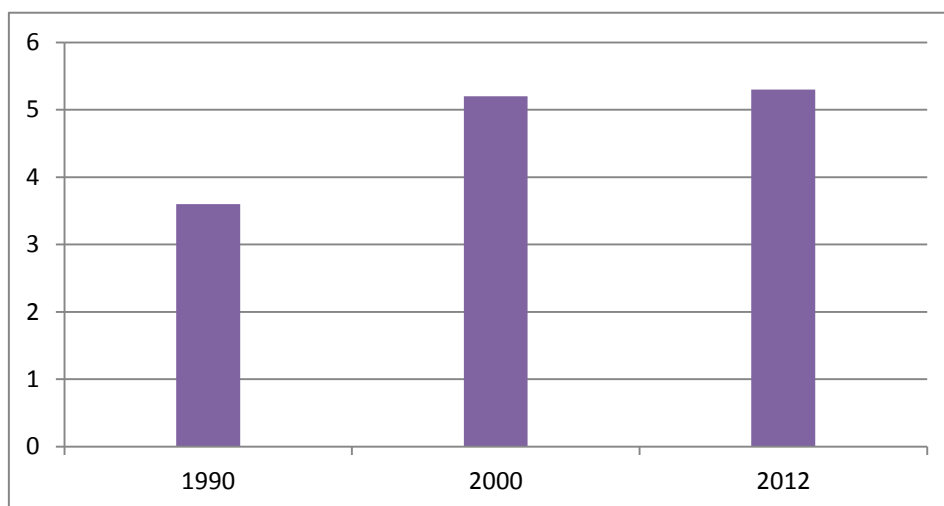
The general outcomes of implementing all these regulations in form of sectoral projects are yet to be judged. The statistics of fossil fuel usage and CO₂ emissions for Iran in the last decades could hardly prove the success at the first sight. Now, the most important question posed is that if the legal bases for reducing energy consumption and for climate protection are available and the public sector units are also working on the issue, why the statistics are still high and the quality of the air in Tehran Province and other large cities in Iran is getting lower. Figures 3.24 and 3.25 highlight the situation of CO₂ emissions emitted in Iran in the last two decades.

Figure 3.24: CO₂ emissions from fossil fuel use and cement production in Iran from 1990 to 2012
(unit: million tonnes of CO₂)



Source: adapted from the PBL (2013), pp. 16-17

Figure 3.25: CO₂ emissions per capita for Iran from 1990 to 2012 (unit: tonnes of CO₂/person)



Source: adapted from the PBL (2013), p. 50

4. Tehran Metropolitan Region Plan (TMRP); a case study

4.1. Introduction

A recent and actual example of regional planning in Iran is needed to investigate the efficiency of Iran's planning system in this level. This example, as a case study, reflects the meaning and the conceptual framework of what is understood under the regional planning and the regional plan among the policy-makers in Iran. The plan presented here refers to the 4th category in list of development plans in Iran (Table 2.9) – Metropolitan Region Plan (MRP). As listed in the above mentioned table, the first three development plans namely country's master plan, national and regional physical plans, and district development master plan refer to the national plans and plans which deal with mega regions or several counties which don't necessarily have the same development priorities or interests. Therefore, the next category, the MRP, was recognized as an actual case of regional planning to be presented in this chapter.

This chapter presents the Tehran Metropolitan Region Plan (TMRP) as a regional plan prepared for the former Tehran Province including Tehran City and other 12 counties in the region. First, Tehran Metropolitan Region (TMR) will be introduced and the reasons why the plan was prepared will be illustrated. Second, the legal basis for it will be reviewed and the responsible bodies will be introduced. Third, a comparative content analysis will be undertaken to prove if the TMRP is a regional plan. Finally, the tools and instruments of implementation will be reviewed and their relevance to the energy efficiency and environmental issues would be analyzed.

4.2. Tehran Metropolitan Region (TMR)

The former Tehran Province was recognized as a metropolitan region and a planning basis for a brand new planning category. The TMR is a name applied to the former Tehran Province, namely before it was split up into two provinces of Tehran and Alborz.²⁴³ The TMR includes Tehran City and its surrounding economic and service centers forming a unity of settlements and activities, in which all areas have a daily-based connection with the others.²⁴⁴

Figure 4.1: the location of former Tehran Province on the map of Iran



Source: adapted from the OpenStreetMap 2017

²⁴³ Alborz Province became the 31st province in Iran on 23.06.2010 after the parliament ratified the bill sent by the cabinet of ministers on 01.02.2010. It includes Karaj as the central county, Savojbolagh, Taleghan, Eshtehard and Nazarabad as other four counties in the province. Self-collected information.

²⁴⁴ See Ghammami, M. (2004), p. 12 for more details.

Figure 4.2: boundaries of former Tehran Province



Source: adapted from the OpenStreetMap 2017

Figures 4.3 (left) and 4.4 (right): Tehran Province after the split-up (left) and Alborz Province (right)



Source: adapted from the OpenStreetMap 2017

4.2.1. Geographic characteristics

4.2.1.1. Location

The TMR is located on the southern foothills of Alborz Mountain Range towards the lower plains in the south. The former Tehran Province bordered Qazvin Province on the northwest, Markazi Province on the southwest, Qom Province on the south, Semnān

Province on the southeast, and Māzandarān Province on the north. If the middle plains are, including city of Tehran, assumed as the central parts of the province, the geographic position and the average altitude from the sea level would be as highlighted in the table 4.1.

Table 4.1: the geographic position and characteristics of Tehran City

	From	To
Longitude	51°,17'	51°,33'
Latitude	35°,36'	35°,44'
Altitude	900 m	1800 m

Sources: adapted from Tehran Municipality official homepage²⁴⁵

4.2.1.2. Climate

The TMR has a semiarid and cold climate. This climate is a combination of dry climate of the southern salt deserts and the more humid climate of Alborz Mountains (Figure 4.5).²⁴⁶ The most famous characteristics of this type of climate are its very warm and dry summer, with the mean maximum temperature ranging between 35° to 40° C, and its cold winter with the mean minimum temperature ranging between 0° to -5° C.²⁴⁷

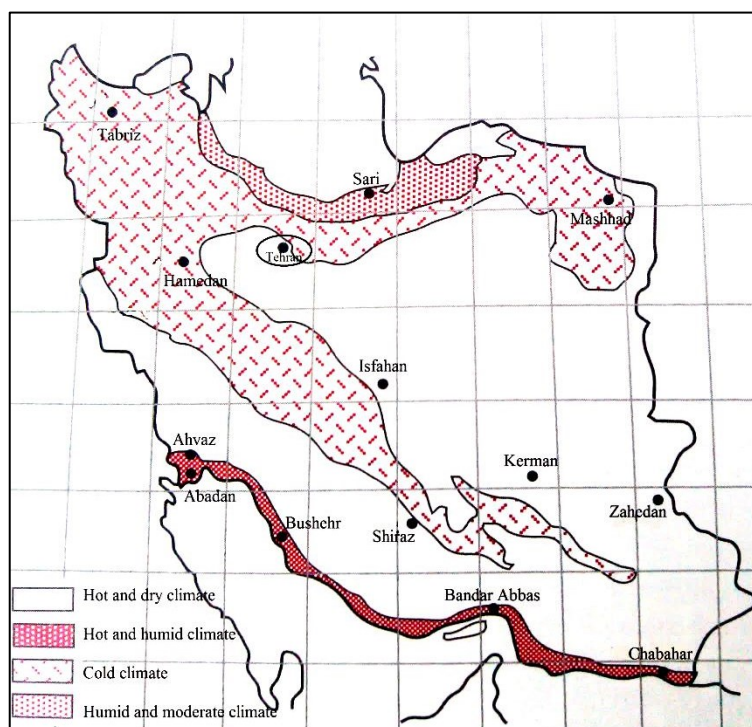
²⁴⁵ <http://www.tehran.ir/Default.aspx?tabid=117> accessed on 09.09.2014.

²⁴⁶ According to Ganji, H. (1979) in Kasmai, M. (2003), p. 83, there are 4 major climate zones recognizable in Iran based on the Köppen's classification. These zones are as follows:

1. *Humid and moderate climate (seashores of Caspian Sea)*
2. *Cold climate (western mountain ranges)*
3. *Hot and arid climate (central plateau) and*
4. *Hot and humid climate (seashores of Persian Gulf)*

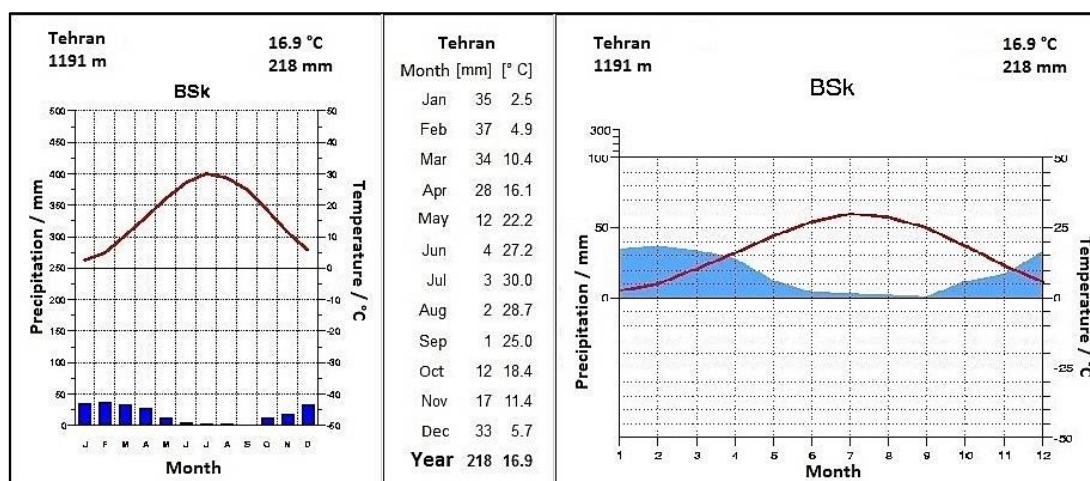
²⁴⁷ See Kasmai, M. (2003), p 99 for more details.

Figure 4.5: climate zones in Iran based on Köppen's classification



Source: adapted from Kasmai, M. (2003), p. 83

Figure 4.6: mean temperature and average precipitation diagrams for Tehran City



Source: adapted from the Klimadiagramme.de²⁴⁸

²⁴⁸ <http://klimadiagramme.de/Asien/teheran.html> accessed on 16.09.2014.

The mean yearly precipitation in Tehran City, in a 30-year period, is about 220 mm and the maximum and minimum monthly precipitations recorded are 9.38 mm and 1 mm for February and September.²⁴⁹

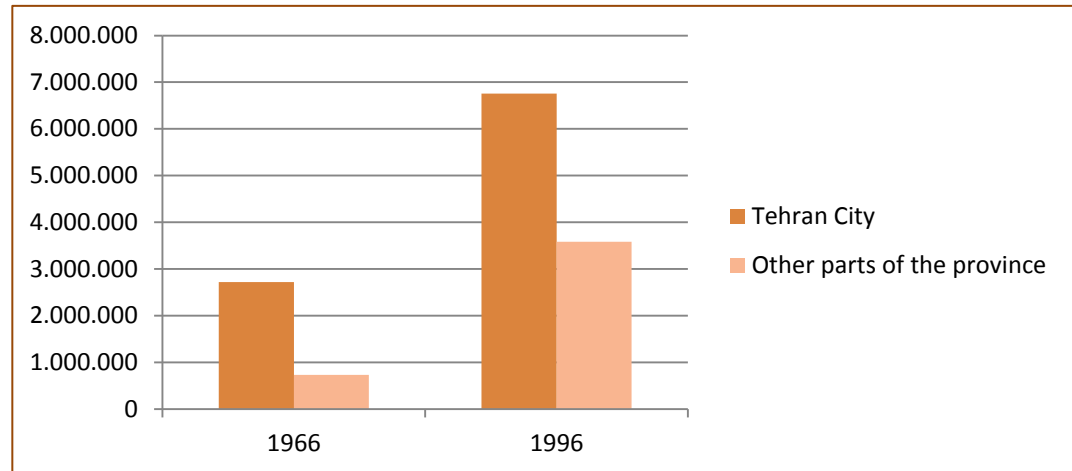
4.2.2. Development background

Tehran became the capital city of Iran in 1775, in Qājār Era, and witnessed a fast grow in the first half of the 20th century. In the 1940s and considering the large public and private investments, Tehran hosted new development features e.g. modern buildings as well as straight and geometric avenues. During the 7 decades from 1920 onwards, Tehran City and its suburbs have been developing and forming the TMR until the whole region faced considerable social problems. From 1920 to 1965, Tehran experienced a kind of inner city development in terms of physical and social infrastructures in about 180 km² around its historic core. In this period, the population of Tehran City grew extremely from 200.000 to 2.700.000 people, more than 13 times.²⁵⁰ But from the late 1960s onwards, the development scheme changed and turned into physical expansion of the metropolis to the other small urban centers with a radius of more than 30 km. This was a result of the development of transportation facilities as well as relocating industrial units outside the city.

²⁴⁹ Adapted from the official homepage of Tehran Municipality at <http://www.tehran.ir/Default.aspx?tabid=117> on 09.09.2014.

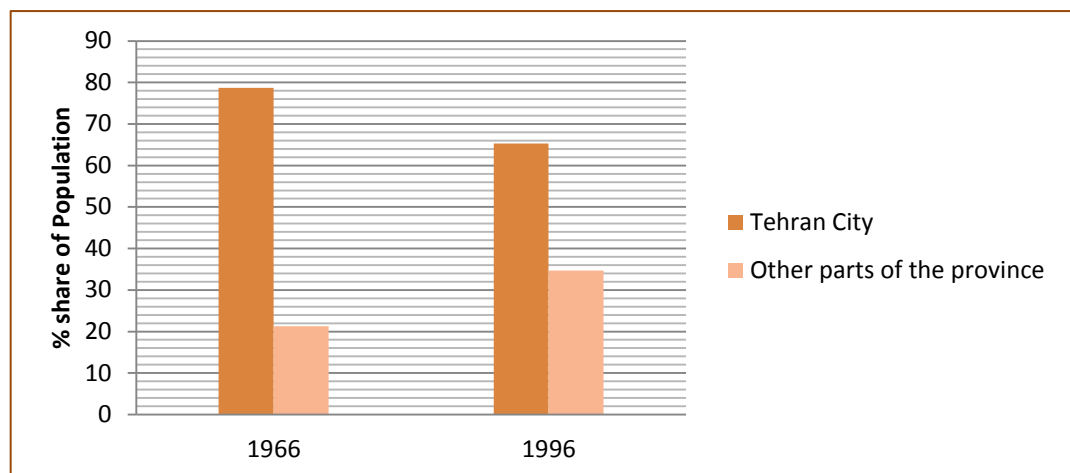
²⁵⁰ See Ghammami, M. (2004), p. 13 for more details.

Figure 4.7: population distribution in Tehran Province in 1966 and 1996



Source: adapted from Ghammami, M. (2004)

Figure 4.8: share of population for Tehran City and the rest of the Province in 1966 and 1996



Source: adapted from Ghammami, M. (2004)

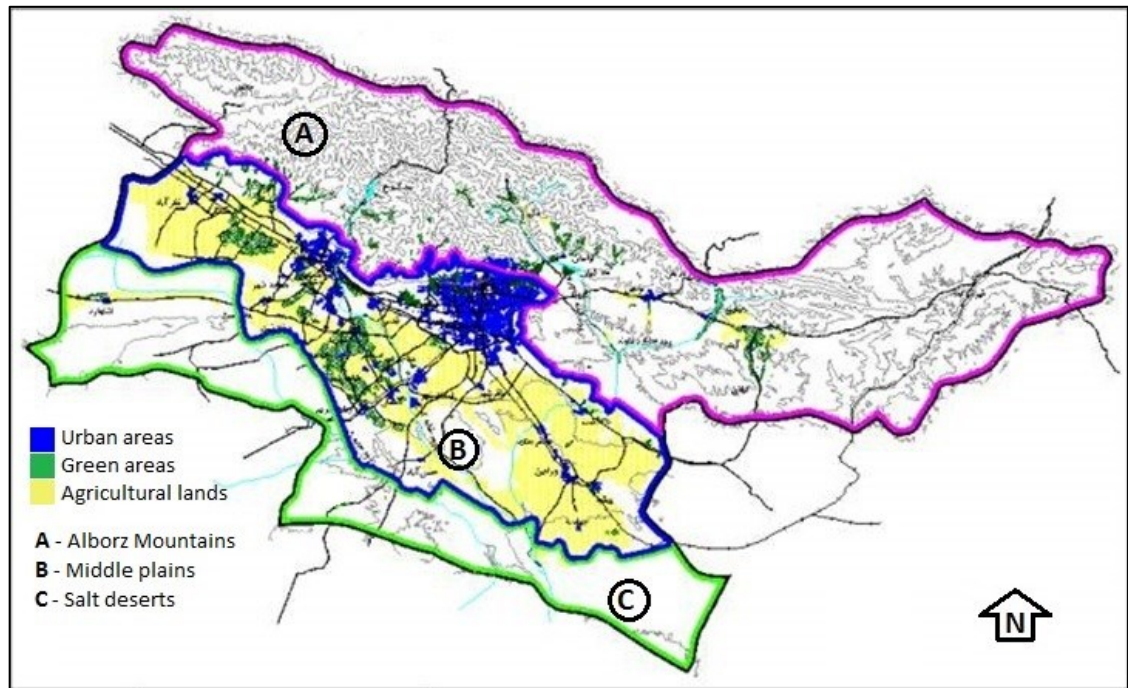
The population of Tehran Province has tripled during the three decades from 1966 to 1996, reaching about 10,400,000 people. As the figures 4.7 and 4.8 show, this population growth pattern illustrates that Tehran City's surrounding urban centers have witnessed greater population growth than Tehran City. Although the population in Tehran City has grown about 2.5 times in the same period, but its share of the whole population of province has decreased. In other words, Tehran City's share of the whole population of province has decreased from about 80 percent to 65 percent and at the same time period the share of population for other counties in the province has increased from 21 percent to about 35 percent. Therefore, the higher pressure of such population growth has been on the lunar urban centers around the city of Tehran. This has brought about the formation of informal settlements in smaller and cheaper urban centers, where the physical and social urban infrastructures were pure. These areas were later known for the social and security problems caused by the poverty and the high population density.

4.2.3. Physical expansion pattern

The TMR could be divided into three geographic zones including northern elevations, middle plains, and southern salt deserts (Figure 4.9). The whole area of the TMR is about 18,800 km², of which the middle plains with 30 percent of the surface area host 97.7 percent of the population of province whereas the northern elevations host only 2 percent and the southern deserts host less than 1 percent of the population.²⁵¹

²⁵¹ See Urban Planning and Architecture Research Center of Iran (2004), p. 11-12 for more details.

Figure 4.9: geographic zoning of Tehran Metropolitan Region



Source: adapted from Ghammami, M. (2004), p. 12

Like many other megacity regions, the expansion of TMR has been determined by the centralization of economic activities and social services in a core urban area, namely Tehran City, and been followed by radius and scattered development pattern with other urban centers experiencing a high population density and lack of urban infrastructure (Figure 4.10). This expansion pattern follows the monocentric city region model with lunar towns in ring hinterlands having shaped an urban corridor among some towns together and with central city; Tehran.²⁵² The land use pattern, whereas, highlights that only less than 15 percent of the TMR area is under the occupation of all urban and rural centers. These urban populated centers were called *urban zones* and there were 8-9 urban zones recognized, by the UPARC in the TMR (Table 4.2).

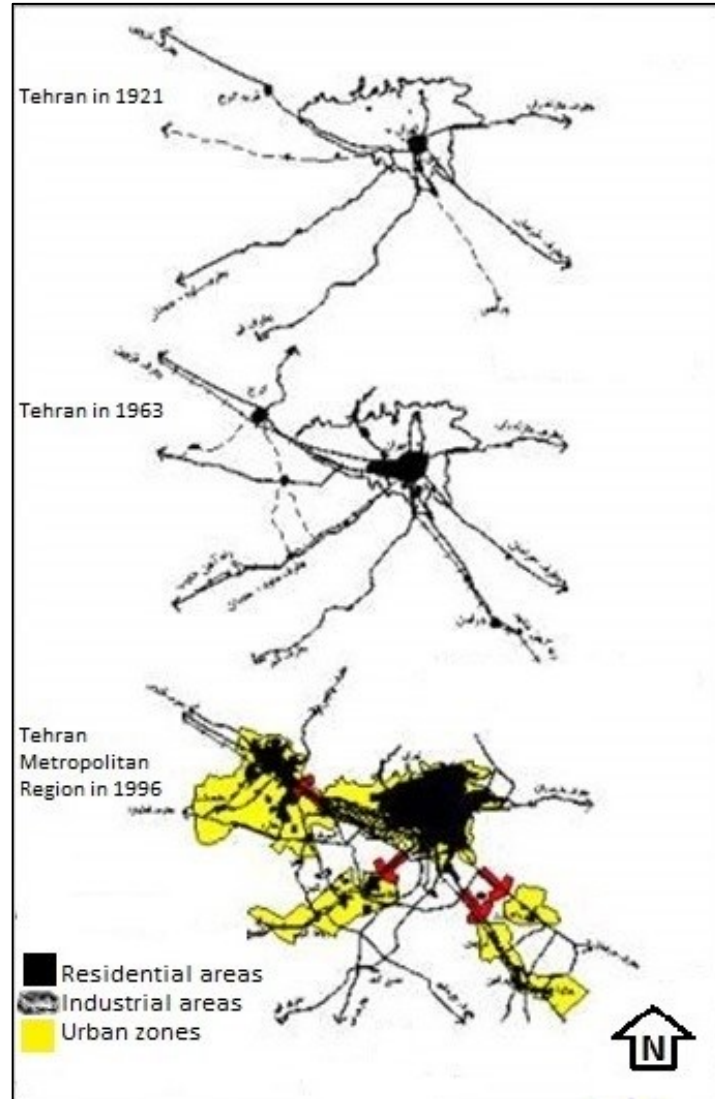
²⁵² See loc. cit., p. 12 for more details.

Table 4.2: urban zones recognized in the TMR with population share

Urban zone	Population 1996	Share of population in Province %	Population density (person/ha)	Area (ha)	Share of area in province %	Dominating activities
Tehran	6,765,784	65.4	97	69,956	3.7	Industrial / service
Karaj-Šahriār	1,508,279	14.6	22	67,259	3.6	Industrial / service / agricultural
Eslāmšahr-Robāṭ Karim	612,959	5.9	20	30,023	1.6	Industrial / service / transportation / storage
Varāmin	358,311	3.5	18	20,408	1.1	Industrial / service / agricultural
Pākdašt	147,368	1.4	16	9,341	0.5	Industrial / agricultural
Haštgerd	134,319	1.3	5	28,713	1.5	Industrial / service
Rudehen-Pardis	41,570	0.4	2	18,309	1	Industrial / service / higher education
Ešteḥārd	10,349	0.1	1	11,956	0.6	Industrial / agricultural
Total	9,578,939	92.6	37	255,965	13.6	

Source: adapted from Urban Planning and Architecture Research Center of Iran (2004), pp. 14-15

Figure 4.10: physical expansion of Tehran Metropolitan Region in 75 years



Source: adapted from Ghammami, M. (2004), p. 28

4.3. Rationale behind the Tehran Metropolitan Region Plan

The most important problem of the TMR was the unbalanced distribution of the population together with lack of a fundamental land use plan and consequently the socioeconomic and environmental damages to the region. During three decades from the late 1960s onwards, only the city of Tehran and Karaj had a comprehensive development plan conducting the development features. Therefore, the processes of settling down of the population and of

urbanization of the smaller centers in the region have occurred without any urban development plan and based on the land price. More surprisingly, at the time of planning the TMRP in 1990s, the TMR embraced 13 counties including Tehran, Damāvand, Eslāmšahr, Firuzkuh, Karaj, Naẓarābād, Pākdašt, Rey, Robāṭ Karim, Sāvojbolāg, Šahriār, Šemirānāt, and Varāmin, each of which included smaller towns with a municipality. Eslāmšahr County and two other small towns in Varāmin County were informal settlements modified later as a town.²⁵³

The formation of informal settlements within and around the counties was not the only problem of the TMR. Uncontrolled development of existing cities and unplanned location of industrial units in their surroundings also damaged the natural landscape and the environment. The UPARC and the *center for architectural and urbanism studies and research* in MRUD concluded the problems as follows:²⁵⁴

- Low quality of housing and urban infrastructures,
- Intensified settlement of low-income families around the capital city, bringing about negative cultural, social, and political impacts,
- Degraded and wastage of agricultural lands,
- Expanded pollution of environment to the water, air, and soil,
- Decreased capacity of regional roads and increased transportation costs and trip durations,
- Decreased quality of physical and social environment in Tehran City caused by the population living in suburban centers and lacking social services and jobs,
- Inefficient use of land in the region because of the outspread and self-willed settlement of population and activities in the region, and

²⁵³ See Ghammami, M. (2004), p. 4 for more details.

²⁵⁴ See Urban Planning and Architecture Research Center of Iran (2004), p. 11 for more details.

- Decreased economic efficiency in the region as a result of lacking social relations in and among the urban centers.

Tehran shared the problems of rapid population growth and the fast physical expansion of the city with other large cities in Iran. The socioeconomic disorders of the early 1990s in the suburbs of Tehran and Mašhad Cities brought about the awareness of special planning measures for the mega city regions.²⁵⁵ Despite the existence of development plans, such as master plan and detailed plan, for large and mega cities in Iran in recent decades, no metropolitan region had experienced the existence of a regional plan, or a type of metropolitan region plan, before the 1990s. Therefore, the TMRP, prepared during the years 1995 to 2003, was the first step towards planning for the mega city regions in Iran.

4.4. Goals and objectives

The main objectives of the TMRP focused on the population and activities redistribution as well as on the land use management. On the other hand, lots of studies on the evolution of Tehran Metropolitan and its current situation have proved that the majority of problems in the province have been resulted from lack of an integrated urban management system able to coordinate the development plans among all cities and towns in the province.²⁵⁶ Therefore, the two following objectives were defined for the plan:²⁵⁷

- Modulating the location of activities and population in the future, and
- Controlling and conducting the use of land.

²⁵⁵ See Ghammami, M. (2004), p. XI for more details.

²⁵⁶ See loc. cit., p. XII for more details.

²⁵⁷ See loc. cit., p. 6 for more details.

4.5. Legal basis

Despite the existence of national physical plan with its mega regions and local districts as planning scales (see chapter 2), there was a need to create another category in planning levels for large metropolitan regions to steer the future developments in those areas. Therefore, the cabinet of ministers ratified an act called the *Planning and Management of Tehran Metropolitan Region and the Country's other Large Cities and their Suburbs* in 1995 to deal with the existing problems of Tehran Metropolitan Region and to prevent the other mega cities from having the same problems in the future.²⁵⁸

The Article 2 of this act clarifies that a metropolitan region comprises of smaller areas, covering the official boundaries of existing municipalities so that no single area remains uncovered within the metropolitan region.²⁵⁹ According to article 2 and the items A and B of article 3 of this act, the former Ministry of Housing and Urban Development (MHUD)²⁶⁰ was appointed to prepare the boundary map for Tehran Province within 6 months and to prepare the Tehran Metropolitan Region Plan within 2 years to be approved by the High Council of Urban Development and Architecture (HCUDA).²⁶¹ The TMRP was granted the final approval by the HCUDA in 2002 and by the cabinet of ministers in 2003.²⁶²

The nature of the TMRP is of a guiding plan having run fundamental socio-economic, physical, and environmental studies on the former Tehran Province (see table 4.4) in order the other local development plans to follow its instructions and recommendations. In other words, the TMRP has assumed the whole province as a planning unit and prepared the basic knowledge and facts for the local planning schemes to use. It has also suggested the establishment of a single integrated development management unit as an implementation body to coordinate the local development plans in the region (see section 4.7.).

²⁵⁸ See loc. cit., p. XI for more details.

²⁵⁹ See Cabinet of ministers (1995), *Planning and Management of Tehran Metropolitan Region and the Country's other Large Cities and their Suburbs*, article 2 for more details.

²⁶⁰ The Ministry of Housing and Urban Development (MHUD) and the Ministry of Roads and Transportation (MRT) were merged on June 2011 to make the new Ministry of Roads and Urban Development (MRUD), See <http://mrud.ir/Portal/Home/Default.aspx?CategoryID=e02d67fa-06b1-4d66-b82b-980f13bb9320> for more details, accessed on 13.08.2012.

²⁶¹ See Ghammami, M. (2004), p. XI for more details.

²⁶² See loc. cit., p. XIII for more details.

4.6. Results; policies and approaches

The TMRP offered a decentralized development pattern for the future of the metropolitan region. Following the aforementioned major objectives of the TMRP, there were policies made in three major sectors of population, transportation, and land use planning. The core idea of these policies could be concluded in reshaping the TMR in a way to have a polycentric mega city region formed by a balanced development of all urban centers. In other words, a kind of decentralization from the core city is recommended. This decentralization could be characterized with relocating insufficient activities to the hinterlands and empowering lunar urban centers in terms of housing, job market, transportation facilities, and other urban infrastructures to attract more population.

4.6.1. In population sector

In order to control the future changes in population distribution in the TMR, the policies should focus on three parts of Tehran urban zone, other urban zones in the metropolitan region, and areas not covered under the urban zone categories.²⁶³ The recommended approaches in these three parts are as follows:²⁶⁴

- *In Tehran urban zone;* the total number of population of Tehran City must be kept as 7,650,000 people and to do so any new building permission as well as vertical construction density on the western parts of Kan Watercourse, eastern land plains, and northern foothills must be limited. These help to prevent urban sprawl especially in the west part, where Tehran and Karaj have the potential of coupling.
- *In other urban zones in the metropolitan region;* Karaj-Šahriār urban zone is the most important one among the other areas and its population must be kept around 2,700,000 people and the agricultural lands and orchards in this zone must be conserved. To reach the TMRP's goals, all these urban zones (see table 4.3) must

²⁶³ See Urban Planning and Architecture Research Center of Iran (2004), p. 13 for more details.

²⁶⁴ See Ghammami, M. (2004), pp. 45-48 for more details.

have to be developed in accordance with their capacities and population foreseen for them, so that they could compete with Tehran City in terms of offering better living conditions. Therefore, all these zones must have master and conductive plans and must be assumed as an integrated urban network which should have a balanced development at the end. All public organizations should also support the build-up and development of new towns e.g. Pardis, Haštgerd, Parand, Andiša, Eštehārd, and Hassan Ābād.

Table 4.3: population capacity of 8 urban zones for the future development in the TMR

Urban Zone	Area / ha	Population in 1996 Approx./prior to plan	Population planned on the 2020 horizon
Karaj-Šahriār	67,259	1,508,000	2,684,000
Haštgerd	28,713	134,000	881,000
Eštehārd	11,956	10,000	499,000
Eslāmšahr-Robāt Karim	30,023	613,000	1,912,000
Hassan Ābād	9,327	13,000	192,000
Varāmin	20,408	358,000	605,000
Pākdašt	9,341	147,000	521,000
Rudehen-Pardis	18,309	42,000	363,000

Source: adapted from Ghammami, M. (2004), p. 43

- *Areas not covered under the urban zones;* in 1996 there were 1,400 populated urban and rural areas in TMR, of which 1,020 areas including 12 towns and 15 villages with population over 5,000 people and 993 villages with less than 5,000 people were located out of urban zones and hosted only 7.3 percent of the total population of the TMR, reaching about 750,000 people. It is anticipated that the population of these areas would be doubled on the 2020 horizon. It is recommended to control these areas as they are and not to allow them to expand and host more population to get an urban center in the future.

4.6.2. In transportation sector

According to the TMRP, the transportation system in TMR should be reformed. The conducting policies, to be considered in planning, were recommended as follows in the box 4.1.

Box 4.1: the conductive policies for reforming transportation system in the TMR

- Developing regional road network,
- Reforming transportation management system,
- Reforming tariff payment and financial structures,
- Decreasing the use of private cars,
- Developing public bus transport network, and
- Considering mobility for poor and low-income groups.

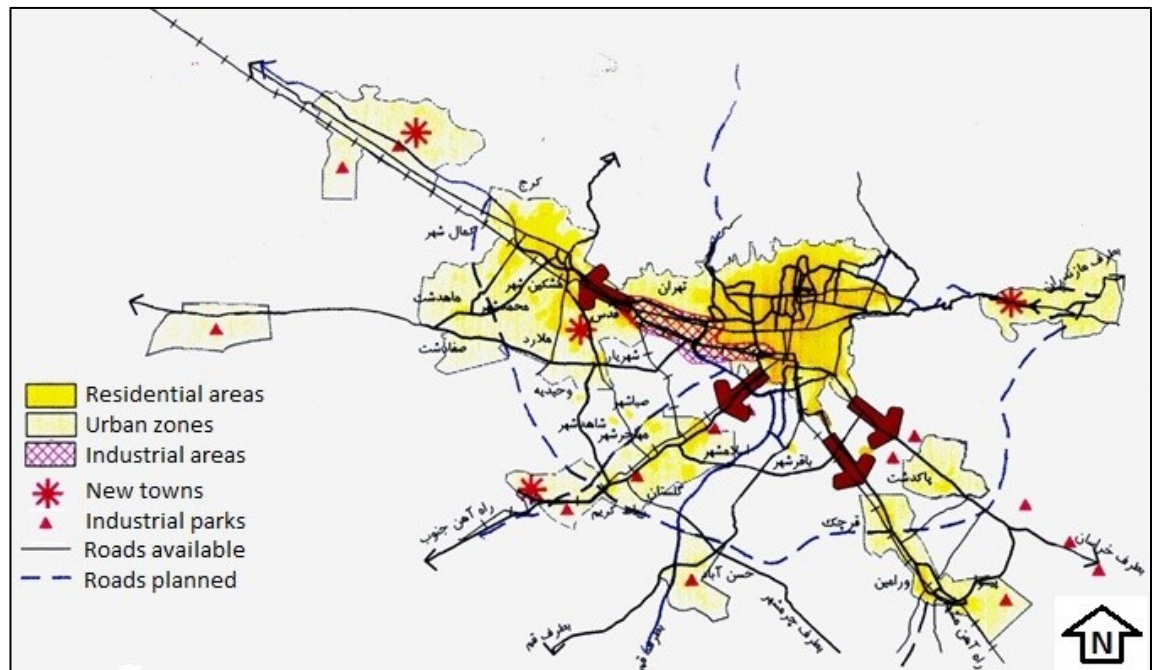
Source: adapted from Urban Planning and Architecture Research Center of Iran (2004), p. 15

4.6.3. In land use planning sector

Completing the existing industrial parks and developing more green spaces throughout the TMR were recommended for this sector by the TMRP. “Those industrial parks locating within the boundaries of urban zones and those planned to be located therein, based on the guidelines of department of environment, should be implemented under the zoning guidelines of the TMRP.”²⁶⁵ The TMRP also recommends the faster implementation of urban development plans within the region to accelerate the completion of industrial parks across the region.

The urban forestry-based management and the expansion of green spaces within and around the urban zones, the rehabilitation of northern foothills of the region through protecting them from livestock grazing, and the creation of urban forests to counterbalance the heat island effects of urban centers for more air ventilation were also other approaches of the TMRP.²⁶⁶

Figure 4.11: future physical structure of Tehran Metropolitan Region



Source: adapted from Ghammami, M. (2004), p. 34

²⁶⁵ Urban Planning and Architecture Research Center of Iran (2004), p. 15.

²⁶⁶ See loc. cit. for more details.

4.7. Requirements for realization of the TMRP

The variety of local urban management and planning units in cities, towns, and smaller urban areas in former Tehran Province had minimized the coordination of development plans going beyond one single planning unit, though the deficits and problems of the whole region had originated in the same urban centers. The current management system of the TMR, comprising of governorates (Farmāndāri), municipalities (Šahrdāri), local governments in small towns (Baḡšdāri), and local offices belonging to ministries could not recognize and admit the deficits, caused by multiple relations among all urban centers, in order to make comprehensive policies.²⁶⁷ On the other hand, the informal settlements played a crucial role in forming the spatial structure of smaller urban centers contributing to the social and environmental disorders of the whole region. Therefore, the reformation of urban management system in the region as well as the resolution to housing problem for urban poor is essential for realizing the TMRP.²⁶⁸ The final approaches recommended by the TMRP could be concluded in following two key points:²⁶⁹

- Creating a single integrated development management unit for the populated part of the TMR,
- Establishing a housing council for low-income households in the MHUD [MRUD].

Establishing a new urban management unit to conduct and implement the TMRP policies in the TMR was a challenge for the planners. The TMRP has recommended the governorate of Tehran Province (Ostāndāri) or a new level of management, namely a higher municipality or higher governorate, to be able to lead the other management units in the TMR should take the responsibility of implementing the plan.²⁷⁰ Finally, “the HCUDA has,

²⁶⁷ See Urban Planning and Architecture Research Center of Iran (2004), p. 15 for more details.

²⁶⁸ See Ghammami, M. (2004), p. 8 for more details.

²⁶⁹ See Urban Planning and Architecture Research Center of Iran (2004), pp. 15-16 for more details.

²⁷⁰ See loc. cit., p. 15 for more details.

when ratifying the plan, decided to authorize the governorate of Tehran Province to implement the TMRP.”²⁷¹

4.8. Outcomes of the TMRP in practice

Neither the creation of integrated development management unit nor the establishment of housing council for low-income households, recommended by the TMRP, was implemented. As mentioned in section 4.3., the former Tehran Province comprised of 13 counties and the urban management system in each county was under the control of a municipality and a governorate. This proves a multiple stakeholder system in the TMR, in which any single county with its smaller towns and rural areas acts only in its own official boundaries. Therefore, the TMRP aiming at creating an integrated urban management system and dividing the whole province into 8 urban zones (see table 4.3) had no chance to succeed from the beginning of the plan. For example, the MHUD did not recognize the urban zones, as it recognizes only the individual municipalities not the urban zones comprising more than one municipality.²⁷² On the other hand, the municipalities of the counties and towns within the 8 urban zones reclaimed their independency and official boundaries.²⁷³ The same thing happened with the municipality of Tehran after the TMRP recommended the integrated urban management plan. “The municipality of Tehran was considering losing its authority to act over its budget because the development budget of that is very high and the municipality did not want to participate in the integrated urban management unit recommended by the TMRP.”²⁷⁴ This shows the importance of the official territories and the full authority over the budget for the municipalities within Tehran Province.

²⁷¹ See loc. cit., p. 15.

²⁷² Taken from the interview with Mrs. Parvand, Office for Physical Planning in the MHUD on 17.05.2011.

²⁷³ See loc. cit.

²⁷⁴ Taken from the interview with Mr. Dr. Hanachee, former deputy minister for architecture and urban development in the MHUD on 22.05.2012.

The lack of coordination among the urban authorities in the TMR together with some policy gaps among the municipalities and local ministerial units²⁷⁵ have also played a negative role on the way of implementing the TMRP's approaches. "The local ministerial units would prefer to keep their revenues and their authority over the urban infrastructures and leave all costs of the projects to the municipalities. On the other hand, if the municipality aims to carry out any project within its territory, it is dependent on all those local units to get permission."²⁷⁶ Therefore, this proves a wide gap between the municipalities and local ministerial units in a county, which becomes more complicated in a province or a metropolitan region.

4.9. Conclusions

The TMRP has been the first attempt in planning at the regional level for the mega cities in Iran and has also been the first regional-level planning effort different from the mega regions recognized by the spatial planning of the country (see section 2.4.2.). Hence, it could have obviously been facing various problems in terms of legal and procedural constraints and deficits. The fact that the TMRP has been assumed to be a leading guideline for local plans throughout the Tehran Province, and the single integrated development management unit suggested by this plan as a requirement for implementation of the plan, confirms that Tehran Province has been defined as a planning unit by the plan and the creation of the development management unit has been a solution to centrally coordinate the local development plans in line with the needs of the whole region.

²⁷⁵ Local ministerial units are local organizations representing the ministries, responsible for urban infrastructures, in each province and county.

²⁷⁶ Taken from the interview with Mr. Dr. Ali Iranshahi, the vice manager of inspection and monitoring dept., Iran Municipalities and Rural Management Organization on 29.04.2012.

4.9.1. TMRP; a regional plan

The term *Metropolitan Region Plan* is somehow ambiguous, as it includes the both terms metropolitan and region, and it does not support a clear discernment if the plan tends to be a metropolitan plan or a regional plan. Based on the contents and objectives of the TMRP, the focus is on problems of smaller settlements around the core Tehran Metropolitan area to include them under a single integrated urban management umbrella and not only to pave the road for further development of Tehran Metropolis. Metropolitan planning assumes the surrounding open spaces as a potential land reserves available for the future metropolitan development as well as the population overflow while regional planning seeks to maintain the balance between the natural and primeval background and the urban environment.²⁷⁷ on the other hand, the more recent definitions of metropolitan region areas pay attention to the balanced development of suburbs around the core metropolitan cities as well as the coherent development of the metropolitan region while the economic and environmental aspects are also taken into consideration (see section 2.2.4.11.). The TMRP is a physical guiding plan conducting the future development of TMR in terms of locating settlements, population, and activities while prescribing the use of land and paying attention to the natural environment.²⁷⁸ In other words, the TMRP determines the land use in a regional scale.²⁷⁹ Therefore, TMRP is a regional plan aiming at dealing with the local problems in the whole province to balance the development schemes in all settlements and their surrounding natural environment. In this way, the daily travelers to the metropolis center could stop moving and the permanent migrated population settled in congested metropolis center could potentially go back to settlements on the countryside.

Furthermore, the regional planning efforts assume the whole region, including settlements, industrial units, and the land, as a single unit and try not to provide facilities in the older centers for a short-term problem reliefs, but to determine what new facilities are needed for

²⁷⁷ See Mumford, L. (1976): Regional planning. In: Sussman, C. (ed.) (1976): Planning the Fourth Migration: the neglected vision of the regional planning association of America, p. 203 for more details.

²⁷⁸ See Ghammami, M. (2004), pp. 8-9 for more details.

²⁷⁹ See Labbafi, A. (2003), p. 1 for more details.

new and young centers.²⁸⁰ From this point of view also, the TMRP could be assumed as a regional planning attempt focusing on problems of smaller settlements in Tehran Province to develop a comprehensive development approach.

Nevertheless, as mentioned earlier in chapter 2, the components of regional planning include economic, demographic, transportation, and land use studies. Therefore, the TMRP having included all of these themes in its basic preparatory studies is a regional plan of its type.

4.9.2. Energy efficiency and environmental considerations in the TMRP

The natural environment within and around the TMR has been enduring a high level of air and water pollutions during the last 50 years, resulting retrogressive and destructive effects on the whole environment and climate of the region. The TMRP has started with the idea of solving the social problems in the highly congested and poor informal settlements in the TMR and carried out fundamental and well-structured studies in preparatory phase of the plan (Table 4.4).

Table 4.4: contents of Tehran Metropolitan Region Plan

No.	Contents of Tehran Metropolitan Region Plan
1	Demographic studies
2	Economic studies
3	Social studies
4	Natural hazards studies

²⁸⁰ See Mumford, L. (1976): Regions – To Live In. In: Sussman, C. (ed.) (1976): Planning the Fourth Migration: the neglected vision of the regional planning association of America, p. 90 for more details.

5	Environmental studies
6	Transportation studies
7	Land use and physical studies
8	Multi-criteria evaluation studies
9	Mathematical models of population distribution
10	Final conclusions

Source: adapted from Ghammami, M. (2004): introductory part, p. 10

The TMRP has indirectly paid attention to the issues of energy efficiency and climate protection with its policy orientations. Taking into consideration that this plan has been prepared from 1995 to 2003, and the issues of climate protection and climate adaptation were not as active as today in Iran, it should be said that although the objectives, studies, and outputs of the TMRP were dedicated to the informal settlements and housing for low-income households, but stressing on transportation development and land use planning as well as development of green spaces in the TMR shows that the environmental and energy efficiency issues have been considered in the plan. The development of new accessibilities and the reformation of existing roads, highways, and local streets were good steps towards decreasing traffic jams within and around urban centers to decrease energy consumption in transportation sector. Planning for more efficient public transport system as well as the extension of new routes were also complementary suggestions of the TMRP in this respect.

This proves that the awareness of the environmental problems had increased among the planners and in the planning system by the time of preparing the TMRP. As presented in earlier chapters, the legal basis and backgrounds for regional planning is available in Iran, so the question is how to plan and implement a regional plan based on the structural framework of existing development planning system. This is the case in energy efficiency issues in the region as well. The legal basis and the awareness of climate change and

climate protection is available on the ground, but the problem is how to define and where to insert such pragmatic programs, protecting the climate and adapting the regions to the climate change, into a regional plan. In addition, the necessary organizational changes and the definition of new tools of implementation are also needed in order to insert the climate relevant policies into the regional planning system.

5. Regional planning and climate adaptation in Germany

5.1. Introduction

The climate change impacts and the need for adaptations in planning contents are considered as a serious field of work in Germany. In this chapter, the goal is to introduce a good regional planning example which deals with the climate change impacts in a particular region in Germany and to review its basic concepts in terms of legal bases and of the climate protection and adaptation strategies. The scope of this investigation covers the need for international experiences in regional level – a minor case study – to support the comparison criteria between the two regions, namely TMR in Iran and the Westsachsen Region in Germany. The reason why the Westsachsen regional model was selected as a minor case study is the importance of the climate adaptation strategies taken into account for a long-term planning perspective. This model functions as an illustrative pattern here to show how a more efficient climate adaptive regional planning model looks like and what components and considerations it possesses.

Urban and regional planning system in Germany is one of the most well-known and prestigious planning models, whose contents, methods, and results have been most admired. Patrick Geddes in his *Cities in Evolution (1915)* refers to the German train stations as very well-organized than in other countries and to the river basin development in *Frankfurt am Main* as a masterpiece of town planning, where the environment, the function, and the population, as users, have been considered as single elements of a development progress.²⁸¹ The building codes of the Prussia in late 18th century, the building line act²⁸² of 1875, Ruhr regional planning authority, German building codes of the 3rd Reich, and the Reich office for regional planning in 1935 paved the ground for further development of the building law and spatial planning regulations. Later on the FSPA²⁸³ of 1965 gave the states an opportunity to establish a legal basis for state spatial planning.

²⁸¹ See Geddes, P. (1915), pp. 192-198 for more details.

²⁸² Fluchtliniengesetz

²⁸³ Raumordnungsgesetz

5.1.1. Regional planning; German interpretation

Regional planning in Germany is understood as a development balance tool guaranteeing a fair and equivalent development across a state or between two or more states. “[It] coordinates land use matters of supra-local interest transcending municipal boundaries.”²⁸⁴ It is assumed as a tool of state spatial planning²⁸⁵ and as the regional level of planning within the states²⁸⁶.²⁸⁷ Therefore, it is kind of smaller spatial planning for subdivisions (regions) of a state to give more concrete definition of spatial structure, made for the whole state, in its regional parts.²⁸⁸

5.1.2. Objectives and tasks

The major tasks and objectives of regional planning in Germany, based on the ROG, deal with local land use and landscape plans, regional development, and coordination of regional policies with the spatial planning decisions of the states (Box 5.1).

Box 5.1: tasks and objectives of regional planning in Germany

Regional planning tasks in Germany are as follows:

- Prepare and update the regional plan,
- Integrate the landscape outline plan for the region into the regional plan,
- Advise urban land-use planning authorities and other public and private planning agencies,
- Collaborate in preparing and updating the state development plan and state sectoral development plans,

²⁸⁴ Pahl-Weber, E., Henckel, D. (eds.) (2008), p. 75.

²⁸⁵ Landesraumordnung

²⁸⁶ Landesplanung

²⁸⁷ See Schmitz, G. (2005), p. 965 for more details.

²⁸⁸ See Pahl-Weber, E., Henckel, D. (eds.) (2008), p. 239 for more details.

- Engage in spatial planning proceedings,
- Collaborate in state sectoral planning,
- Take the initiative in regional policy to promote and develop the region,
- Cooperate with regional agencies for joint programmes.

Source: adapted from Schmitz, G. (2005), In: Pahl-Weber, E., Henckel, D. (eds.) (2008), p. 75

The most common tasks of regional planning, here, deal with territorial issues of urban centers in the region as well as settlement structure, open space structure, and infrastructures.²⁸⁹

5.1.3. Legal bases and structural organization

According to the FSPA (ROG) of 2008, each state (Land) should have a spatial plan and a regional plan as part of it for all parts of the state.²⁹⁰ The FSPA, as the legal basis, binds the states, especially the ones embracing several urban centers, to prepare regional plans. “It also requires the involvement of superordinate and subordinate tiers of planning in regional planning in accordance with the “mutual feedback” principle.”²⁹¹

The spatial planning structure in Germany is divided into three levels of federal, state, and local planning bodies. “Federal spatial planning is limited essentially to the development of guiding principles and, principles of spatial planning which also provide the legal basis for state spatial planning and superordinate specifications for sectoral planning. State spatial planning gives concrete form at the state level to the federal principles of spatial planning, while at the local level, final planning goals are developed in compliance with both federal

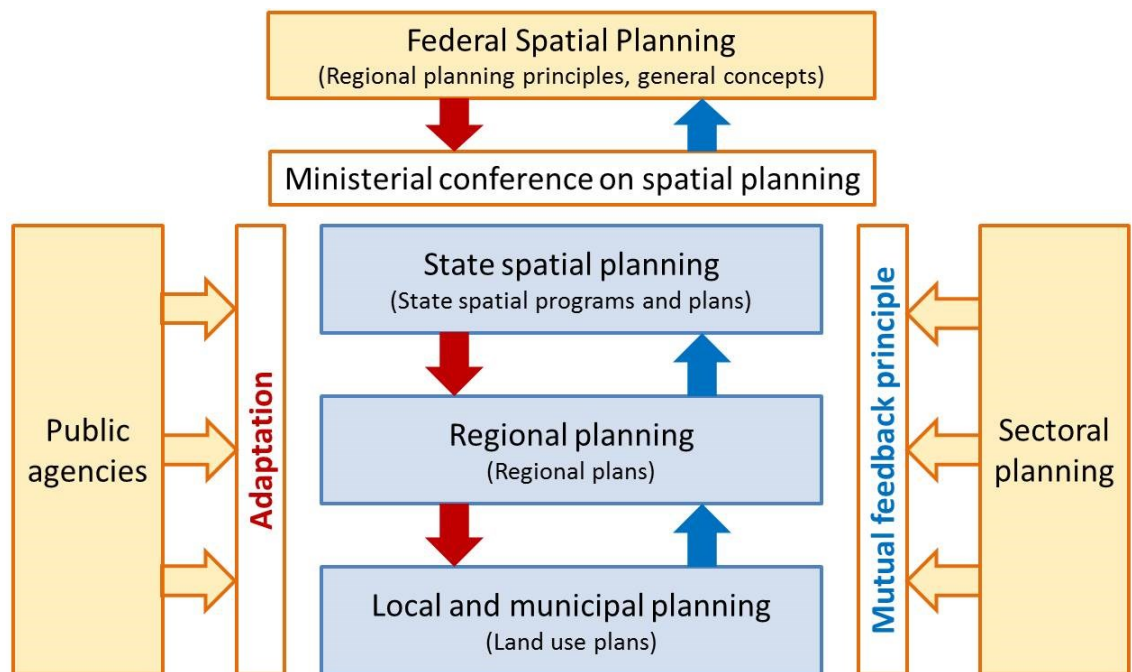
²⁸⁹ See Schmitz, G. (2005), In: Pahl-Weber, E., Henckel, D. (eds.) (2008), p. 77 for more details.

²⁹⁰ See “Raumordnungsgesetz (ROG) (2008), article (abschnitt) 2, part (§) 8, clauses 1-2” for more details.

²⁹¹ Pahl-Weber, E., Henckel, D. (eds.) (2008), p. 76.

and state spatial planning specifications.”²⁹² The mutual feedback principle (Figure 5.1) provides all members of the spatial planning and implementation circle with the possibility of participating in decision making processes. It pays also attention to the public participation and adaptation of their ideas into the regional and local plans.

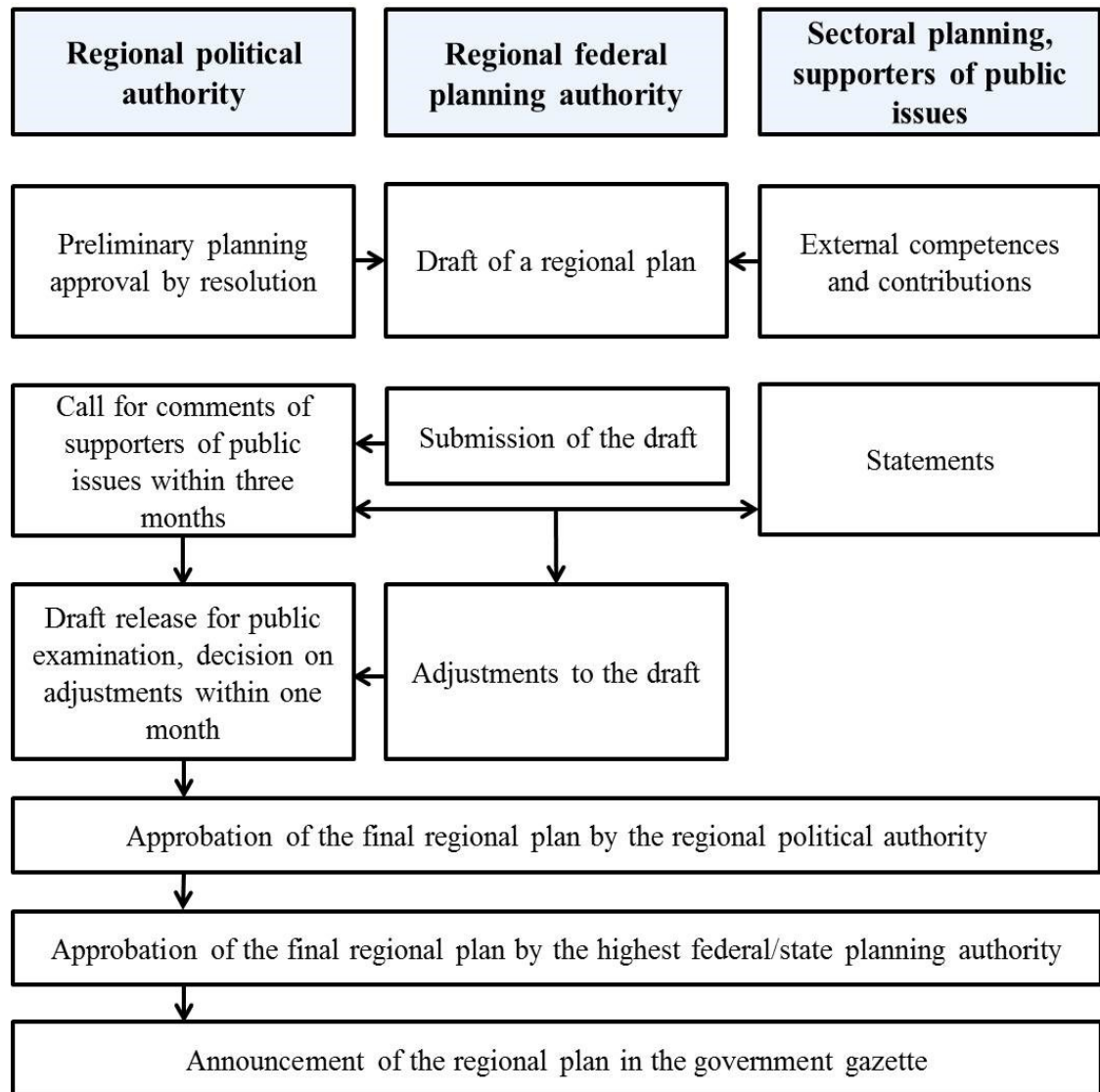
Figure 5.1: the structure of regional planning system in Germany



Source: adapted from Deutscher Bundestag (2005), p. 257

²⁹² See loc. cit., pp. 38-39.

Figure 5.2: preparation procedures of a regional plan



Source: adapted from Mertins, G. & Paal, M. (2009), p. 42

German political and planning structure represents a federal democratic system in which the planning occurs in three different levels including the national, the federal land, and the municipal level.²⁹³ The federal government legitimizes the general spatial development framework, and the planning and implementation takes place in the federal states (Länder) and regions (BBR 2005). This is what Newman & Thornley (1996) call as a decentralized decision-making system associated with the Basic Law (Grundgesetz) of the 1949.

5.1.4. Planning regions

As mentioned earlier, the regions are formed where the states' borders cross one or more urban centers, so defining the planning regions and preparing the regional plans are the tasks of the states. Therefore, planning regions differ in size and in planning contents prepared for them.²⁹⁴ That is also to mention that a planning region encompasses the boundaries of some county-free cities and counties.²⁹⁵ Nevertheless, the metropolitan region planning is also recognized in Germany, as another type of units for regional planning in practice, to deal with megacities and their surrounding areas forming a greater network of cities and smaller settlements. There are more than 90 planning regions with planning associations²⁹⁶ in 16 states in Germany, some of which have been covered by the metropolitan regions (Figure 5.4).

²⁹³ See Mertins, G. & Paal, M. (2009), p. 36 for more details.

²⁹⁴ See Pahl-Weber, E., Henckel, D. (eds.) (2008), p. 76 for more details.

²⁹⁵ See loc. cit., p. 77 for more details.

²⁹⁶ Regionale Planungsverbände

Figure 5.3: 16 states in Federal Republic of Germany



Source: adapted from the OpenStreetMap 2017

Figure 5.4: metropolitan regions in Germany



Source: adapted from the OpenStreetMap 2017 and BBR Bonn 2010

5.1.5. State spatial and regional planning tools

The state spatial plans²⁹⁷ and the regional plans²⁹⁸ are the most important planning tools for regional planning in Germany, which coordinate all programs and projects carried out by local authorities with the final goals of state and federal spatial planning principles. There have also been other tools set by the FSPA to safeguard the state spatial and regional planning against the violation of procedural and formal requirements, to derogate from a regional plan if the main goals of the regional plan are not affected, to prohibit specific projects if they conflict with the spatial structure planning goals, and to adapt the spatial significant plans to the goals of spatial planning through the observation of public authorities.²⁹⁹

The FSPA also requires the spatial and regional planning authorities to prove the supra-local and regional aspects of regional significant plans and measures.³⁰⁰ This procedure³⁰¹ is assumed as a coordination tool controlling the compliance of all regional plans with the state spatial planning goals. Monitoring the spatial structures and plans, exchanging information among all planning bodies on regional programs they carry out, reporting actual and updated status of spatial affairs e.g. settlement structures and development measures, and presenting them in the form of maps are other tools foreseen by the FSPA.³⁰²

Beside all these formal planning tools, there are also some informal tools supplementing the process of reaching spatial planning goals. The informal tools include state spatial development plans and instruments if they have no statutory binding forces, and they can be used focusing on specific problems without any binding requirements.³⁰³ The regional

²⁹⁷ Such as *state development plan (Landesentwicklungsplan)*, *state spatial structure programme (Landesraumordnungsprogramm)*, and *state development programme (Landesentwicklungsprogramm)*. Pahl-Weber, E., Henckel, D. (eds.) (2008), p. 44.

²⁹⁸ Such as *regional plan (Regionalplan)*, *regional spatial structure programme (Regionales Raumordnungsprogramm – RROP)*, and *area development plan (Gebietsentwicklungsplan)*. See loc. cit.

²⁹⁹ See loc. cit., pp. 44-45 for more details.

³⁰⁰ See “Raumordnungsgesetz (ROG) (2008), article (abschnitt) 2, part (§) 15, clauses 1-2” for more details.

³⁰¹ Raumordnungsverfahren (ROV)

³⁰² See Pahl-Weber, E., Henckel, D. (eds.) (2008), pp. 45-46 for more details.

³⁰³ See loc. cit., p. 46 for more details.

development concepts, city networks, and contractual agreements on preparing and implementing spatial structure plans are the examples of the informal tools.³⁰⁴

5.2. Regional model projects³⁰⁵; climate adaptation in practice

5.2.1. Introduction

Today, the climate change is one of the most deciding factors in any spatial and regional development planning. There are comprehensive research programs in Germany, which have been dealing with this issue, in three levels of transnational cooperation in spatial planning themes (*INTERREG*), spatial development strategies for climate change in regional level (*KlimaMORO*), and local urban strategies for climate change in municipal level (*KlimaExWoSt*). These model projects focus on how to protect the climate from further damages resulting from fossil fuel combustion, and how to adapt the urban and regional plans to the new climate conditions. Each program runs a wide range of topics developed from the challenges of climate change impacts on the urban regions (Table 5.1).

Table 5.1: programs, model projects, and topics relating to the CC and CA in Germany

Program	Title / Model project	Topics
INTERREG (transnational cooperation)	Future cities	Urban climates – analysis map in Arnheim
	Livinggreen.eu	Livinggreen Lab
	POWER cluster	Touring exhibition “Fascination Offshore”
	Safecoast	Damage analysis on Nordsee (North Sea) coast
	Bioenergy promotion	Sustainable use of Biomass in states and regions of Ostsee (East Sea)
	Longlife	Longlife design class 2010
	LABEL	Flood risk management

³⁰⁴ See loc. cit. for more details.

³⁰⁵ Modellvorhaben

		Adaptation to risks and climate change
	RUBIRES	Making regional Biomass potential energetic usable
	CLISP	Adaptation to climate change through spatial planning in Alpine
	AdaptAlp	Integrated risk management in Alpine
KlimaMORO (regional level)	Vorpommern	Adaptation to the coastal dynamics
		Safeguarding regional groundwater resources
	Havelland-Fläming	Water control in Havelniederung
		Wind severe events
	Westsachsen	Climate change – strategies in Colditzer Forest
		Vulnerability analysis for Westsachsen
	Oberes Elbtal / Osterzgebirge	Regional consensus making, strategy for forest increase and development as an example
		Further development of the regional plan
	Mittel- and Südhessen	Municipal action guideline for settlement climate
		Devastating floods – relevant to regional planning?
	Mittlerer Oberrhein / Nordschwarzwald	Comprehensive and interdisciplinary action program
		Problem specification through stakeholder participation
	Stuttgart	Heat and health in climate change
		Climate information system for Stuttgart Region
KlimaExWoS t (urban strategies)	Neumarkt / Oberpfalz	Klima NEU – extension of renewable energies
		Participative development of climate adaptation strategy
	<i>Climate change and severe weather events from the view point of spatial planning in municipalities</i>	
	Aachen City region	Climate compatible industrial and trade area development

	Bad Liebenwerda City	A city for feeling comfortable in climate change
	Essen City	City faces climate change
	Jena City	JenKAS – Jena climate and adaptation strategies
	Karlsruhe Neighborhood Association	Inner development versus climate comfort
	Nürnberg City	Climate change adaptation strategy of Nürnberg
	Regensburg City	UNESCO world heritage Old town – historic heat reservoir
	Saarbrücken City	Urban open space planning as field of action for adaptation activities
	Syke City	Responsible acting in climate change

Source: adapted from Bundesministerium für Verkehr, Bau und Stadtentwicklung (2010)

In this part of the current chapter, the Westsachsen regional model³⁰⁶, as one of the KlimaMORO model projects, will be reviewed in order roughly to highlight the main objectives of the project regarding the climate adaptation strategies and activities in the region. The major reason why this region is spoken about here is that it receives the same impacts of climate change as the TMR receives in Iran. The goal is to introduce a concrete research and planning project pertaining to climate adaptation in a region in Germany and to have an up-to-date regional planning model, the contents of which could be considered for the future plans in the TMR. A detailed focus on the model project and a deep analysis of its organizational processes is not aimed here.

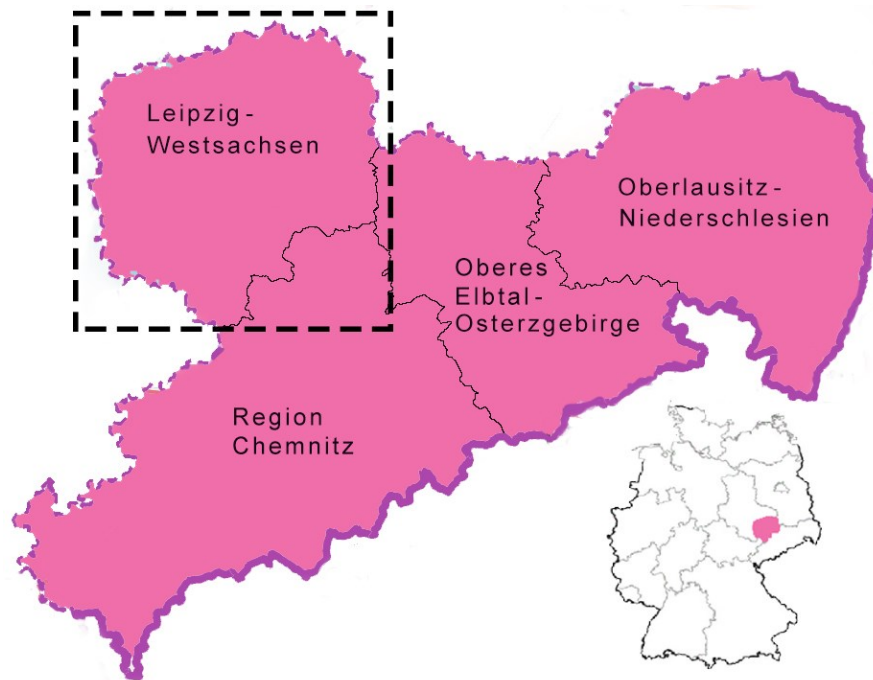
³⁰⁶ Modellregion Westsachsen

5.2.2. Westsachsen; a regional model project

5.2.2.1. Geographic location

Centrally located in eastern part of Germany, the Westsachsen Region is the northwestern part of the Sachsen Free State³⁰⁷ and forms one of the four regional planning units in the state. The Leipzig-Westsachsen regional planning association³⁰⁸ is responsible for the regional planning in the region and includes the city municipality of Leipzig³⁰⁹, Leipzig administrative district³¹⁰, and Nordsachsen administrative district³¹¹ (Figure 5.5).³¹²

Figure 5.5: the location of Westsachsen Region in Sachsen Free State and in Germany



Source: adapted from the OpenStreetMap 2017 and the RPV Leipzig-Westsachsen³¹³

³⁰⁷ Freistaat Sachsen

³⁰⁸ Der Regionale Planungsverband Leipzig-Westsachsen

³⁰⁹ Kreisfreie Stadt Leipzig

³¹⁰ Landkreis Leipzig

³¹¹ Landkreis Nordsachsen

³¹² RPV (Regionaler Planungsverband) Leipzig-Westsachsen, <http://www.rpv-westsachsen.de/verband.html> accessed on 11.11.2014.

³¹³ RPV Leipzig-Westsachsen, <http://rpv-westsachsen.de/planungsregion/> accessed on 11.11.2014.

5.2.2.2. Structure of regional administration

Westsachsen Region as a regional planning unit has a regional planning association which is a law-making body belonging to the public law, and directs the development activities in the region. Having been established in 1992, this planning association comprises of city municipality of Leipzig, Leipzig administrative district, and Nordsachsen administrative district as body members, different committees as well as consulting members (see table 5.2). The policies and decisions made by the regional planning association are implemented by the “regional planning authorities”³¹⁴.³¹⁵ The supervision over the tasks of the association is run by the higher spatial planning authority, namely the “ministry of the interior in Saxony State”³¹⁶.³¹⁷

³¹⁴ Regionale Planungsstellen

³¹⁵ Adapted from the official homepage of Leipzig-West Sachsen Planning Association at <http://rpv-westsachsen.de/der-regionale-planungsverband-leipzig-westsachsen/organisation/> on 20.04.2016.

³¹⁶ Sächsisches Staatsministerium des Innern

³¹⁷ See loc. cit.

Table 5.2: overview of the organizational bodies in Leipzig-West Sachsen planning association

City members	Regional planning association bodies		Consulting members
Municipality of Leipzig Leipzig administrative district Nordsachsen administrative district	Association assembly		Association assembly <i>10 consulting members</i>
	Dean of association	Planning committee Brown coals committee	Planning committee <i>2 consulting members</i>
	1. Representative 2. Representative		Brown coals committee <i>10 consulting members</i>
	Association administration		
	Regional planning agency		

Source: adapted from Leipzig-West Sachsen Planning Association homepage³¹⁸

³¹⁸ <http://rpv-vestsachsen.de/der-regionale-planungsverband-leipzig-vestsachsen/organisation/> accessed on 20.04.2016.

5.2.2.3. Climate

Westsachsen Region belongs to the warm and humid climate zone of middle latitudes with a mild winter and not very hot summer.³¹⁹ The region can be subdivided into two major climatic areas including sub continental lowland climate and sub continental hill land climate of northwest and middle Sachsen.³²⁰

Table 5.3: significant climatic data of Westsachsen Region before and after 1961

Time period	Mean annual temperature	Annual precipitation
1864-1920	8.7° C	603 mm
1901-1950	8.9° C	545 mm
1961-1990	9.1° C	512 mm

Source: adapted from Schmidt, C., Seidel, A. et al (2011), p. 19

5.2.2.4. Objectives

Westsachsen Region³²¹ would, based on the climate projections, be facing the problems of temperature increase, precipitation decrease, and decline in fresh water supply at the end of current century. The main challenge here is the changes to be made to and new strategies to be fed into the regional plans and policies based on the new climatic conditions. In other words, the future regional plans should be adapted to the new climatic conditions of the region. Therefore, the main objective of this model project is to conduct a regional spatial strategic plan matching the climate change impacts.³²² In the earlier phases, the major task of the model project is to measure the vulnerability of natural and urban environments in the region against higher temperature, heavy rainfalls, and floods and surface water as well

³¹⁹ See Schmidt, C., Seidel, A. et al (2011), p. 17 for more details.

³²⁰ See BFT (1972); In Schmidt, C., Seidel, A. et al (2011), p. 17 for more details.

³²¹ Western Saxony Region

³²² See Bundesministerium für Verkehr, Bau und Stadtentwicklung (2010), p. 49 for more details.

as to estimate the vulnerability of the region in terms of restrictions on the land use and fresh water supply imposed by the climate change impacts.

5.2.2.5. Climate projections

Measuring the vulnerability of the region against climate conditions is basically based on the climate projections and requires a record-based climate analysis in which a long term climatic values e.g. temperature and precipitation rates are available and comparable. In this respect, the climatic characteristics of Westsachsen Region before 1961, from 1961 to 1990, and from 1991 to 2005 have been considered. Accordingly, the climate projections for the time period of 2041 to 2050 and 2091 to 2100 have been predicted. Interestingly, the first climate trend showing the real changes has appeared from 1991 to 2005 not earlier.

The second requirement for the future climate projections is to anticipate the way the energy would be used in the future, as it has been the most important factor affecting the climate so far. In Westsachsen model project there have been three possible scenarios considered for the future development schemes and energy usage (Box 5.2).

Box 5.2: three possible scenarios for development schemes and energy usage affecting the climate

- (Scenario B1) Optimal scenario with a CO₂ reduction in the second half of 21st century,
- (Scenario A1B) estimates the balanced use of fossil and non-fossil energy sources in the future, and
- (Scenario A2) pessimistic scenario predicating an economic-oriented development with a constant increase in CO₂ emissions till the end of 21st century.

Source: adapted from Schmidt, C., Seidel, A. et al (2011), p. 20

The climate projections for Westsachsen Region warn of heat waves as well as water shortage in the upcoming decades. “While the average summer temperature in the time period from 2091 to 2100 will increase up to 3° C, a decrease of up to 15 percent in precipitation is also forecasted.”³²³ Therefore, it is necessary to find out what impacts the climate change has on different elements of the regional environment. “Here, the vulnerability of individual impacted factors such as water balance, agriculture, traffic, cities and trade must be taken into account.”³²⁴

Hence, the regional impacts of the climate change on Westsachsen Region are considered in three major categories as follows:³²⁵

- Increasing heat waves in summertime,
- Increasing the risk of heavy rainfalls and flash floods, and
- Reducing the water supply capacities in summertime.

The vulnerability analyses are, then, carried out for the whole region as a basis for further recommendations to be taken into account in preparing the future regional plans as well as the conduction of any regional development activity.³²⁶

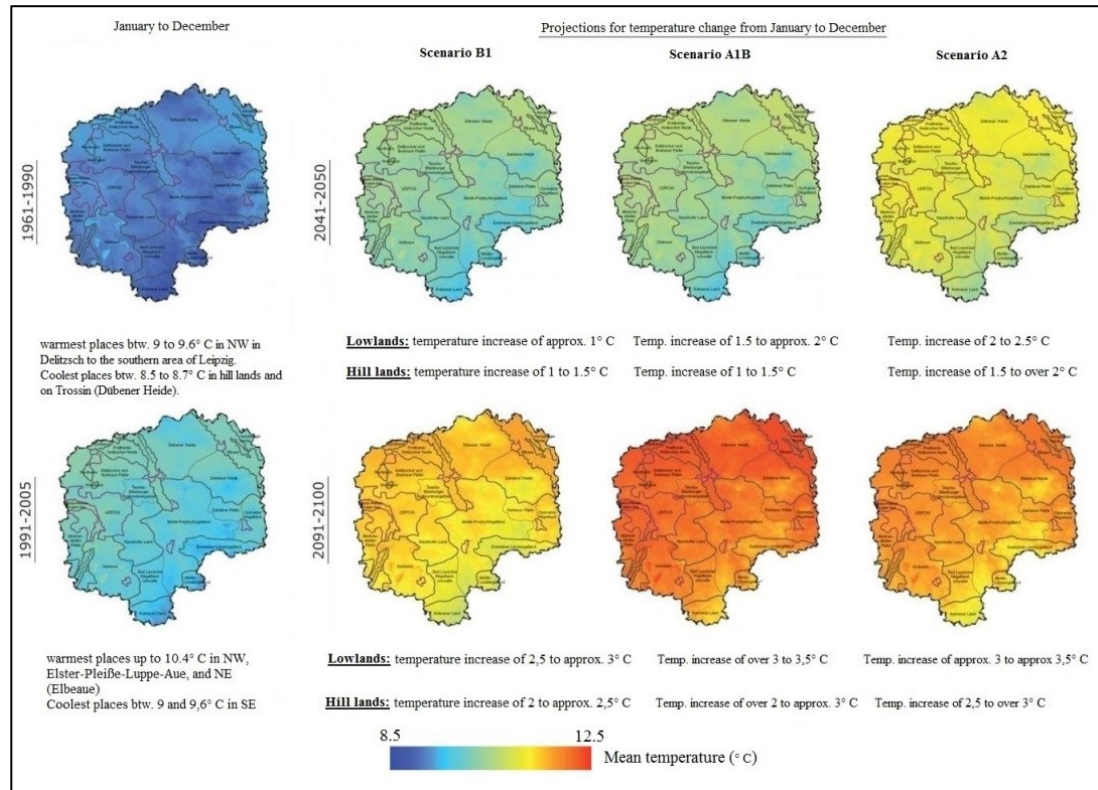
³²³ See loc. cit.

³²⁴ Stock, M. (2010); In Bundesministerium für Verkehr, Bau und Stadtentwicklung (2010), p. 6.

³²⁵ See Bundesministerium für Verkehr, Bau und Stadtentwicklung (2010), p. 49 for more details.

³²⁶ See loc. cit. for more details.

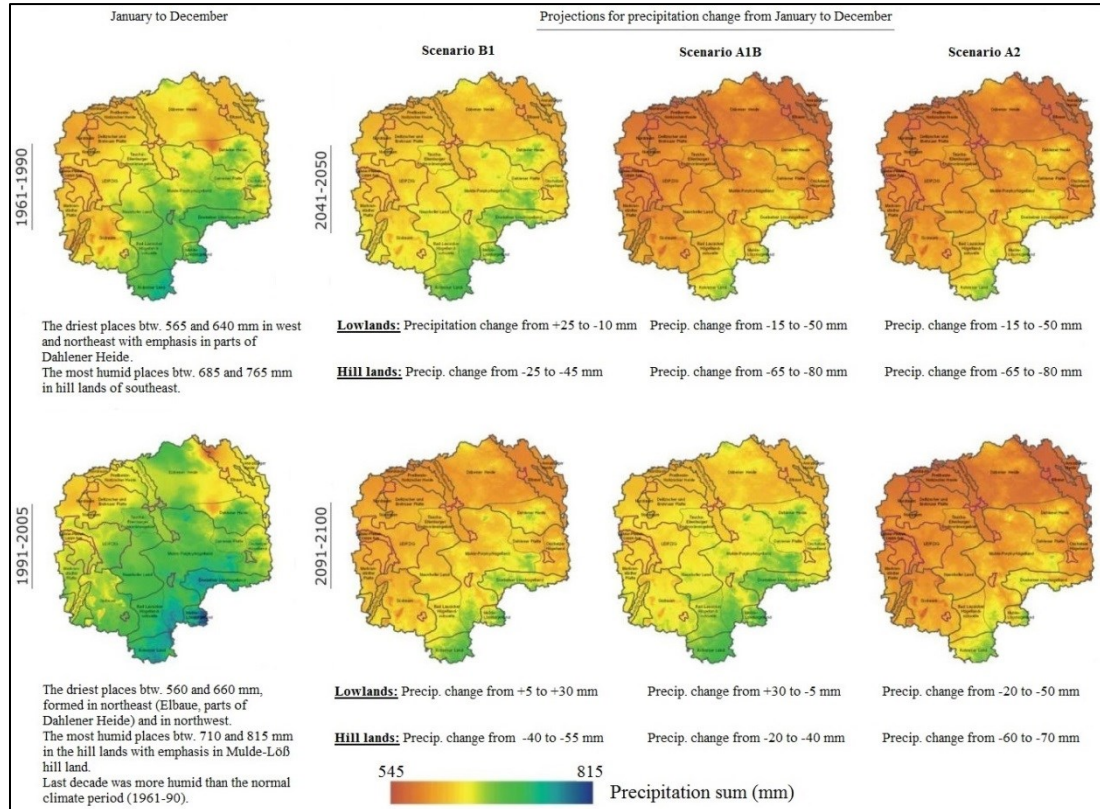
Figure 5.6: projections for temperature change for time periods of 2041-2050 and 2091-2100 based on the mean yearly temperature records from 1961-2005 in Westsachsen, considering all three scenarios



Source: adapted from Schmidt, C., Seidel, A. et al (2011), p. 28

As the figure 5.6 shows, the mean yearly temperature in Westsachsen Region would increase in the middle and the end of the 21st century. The mean yearly temperature increases up to 3° C in lowlands and up to 2.5 ° C in hill lands if the optimal development scenario (B1) could be realized. But, if the pessimistic scenario is realized the lowlands would have about 3.5° C and the hill lands would experience over 3° C by the end of 2090 decade.

Figure 5.7: projections for precipitation change for time periods of 2041-2050 and 2091-2100 based on the mean yearly precipitation records from 1961-2005 in Westsachsen, considering all three scenarios



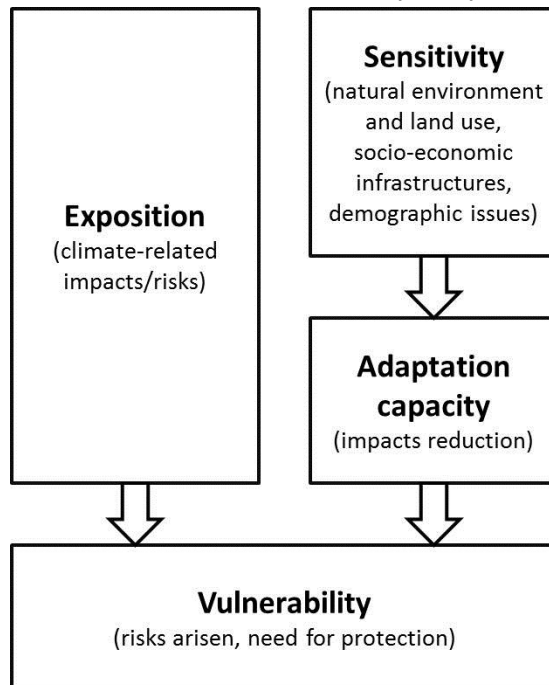
Source: adapted from Schmidt, C., Seidel, A. et al (2011), p. 34

The figure 5.7 also highlights the impacts of the development scenarios, with more or less CO₂ release on the mean yearly precipitation rates in the region. If the scenario B1 (CO₂ reduction) could be the case, the mean precipitation decreases only up to -10 mm in lowlands and to -55 in hill lands. Nevertheless, if the scenario A2 (constant increase in CO₂ emissions) remains the case, the mean precipitation decreases up to -50 in lowlands and to -80 in hill lands.

5.2.3. Vulnerability analysis in Westsachsen Region

The vulnerability analysis deals with the reactions of the natural and living environments in the region against the changes of the climate and its environmental impacts. The model project Westsachsen Region has, along with its climate studies and projections for the coming decades, investigated the vulnerability of the region against concrete impacts of the new climate conditions in order to recommend adaptation strategies for the future planning contents. The conceptual framework for the analysis comprises of four topics including the climate-related risk factors posed by the climate change impacts, the sensitive natural elements and social groups which could be affected by those risks, the capacities for impacts reduction, and also the risks and hazards arisen as a result of the vulnerability of the region against the risk factor (Figure 5.8).

Figure 5.8: conceptual framework for the vulnerability analysis – Westsachsen Region



Source: adapted from Schmidt, C., Seidel, A. et al (2011), pp. 43-140

There have been various risk factors identified and the vulnerability of the region against them has been analyzed. The major risk factors are as follows:³²⁷

- Heat waves and yearly number of the hot days,
- Heavy rainfalls,
- Flash floods and surface water,
- Decline in water supply in summertime,
- Vulnerability of land use against the climate change, and
- Vulnerability of the cultural landscape in the region.

5.2.3.1. Vulnerability against heat waves

The heat wave means “a period of at least three days where the combined effect of excess heat and heat stress is unusual with respect to the local climate. Both maximum and minimum temperatures are used in this assessment.”³²⁸ The vulnerability against heat waves refer, then, to the vulnerability of the region against the increasing yearly mean temperature as well as the increasing number of the hot days with the temperature of more than 30° C in a year.³²⁹ The number of the hot days in a year has been considered as an indicator to assess the risks of the heat waves in the region.³³⁰ Moreover, the sensitivity of both natural and manmade environments was taken into account.³³¹ The main adaptation capacities considered here are the cold and fresh air runoff pathways as well as the radiating function of green spaces within and outside the urban areas, in terms of producing fresh air and neutralizing the heat effects.³³² Based on the results of this analysis, the most

³²⁷ See Schmidt, C., Seidel, A. et al (2011), pp. 43-140 for more details.

³²⁸ Nairn, J., Fawcett, R. (2013), p. 13.

³²⁹ See Schmidt, C., Seidel, A. et al (2011), p. 43 for more details.

³³⁰ See loc. cit., p. 44 for more details.

³³¹ See loc. cit. for more details.

³³² See loc. cit., p. 45 for more details.

vulnerable areas in the region are the urban areas with higher densities e.g. Leipzig City and other urban centers in northern parts of the region.³³³

5.2.3.2. Vulnerability against heavy rainfalls

Schmidt and others (2011) conclude³³⁴ in the Westsachsen model project that:

- heavy rainfall event means a day with more than 55 mm rainfall,
- heavy rainfalls happen more often in the summertime,
- there have been a heavy rainfall trend from 1991 to 2005, and
- more investigation is needed to predict how often and how strong the heavy rainfalls could occur in the future.

The vulnerability of the regional environment against heavy rainfall events explains the relationships amongst the exposition of the regional environment to the heavy rainfall, its sensitivity to the water erosions caused by it, and its capacity of adaptation to the risk factors of changing climate.

“The water erosion exposition and the soil retention capacity have been taken into account for the vulnerability analysis [of the Westsachsen Region] against heavy rainfalls.”³³⁵ The heavy rainfall events contribute significantly to an increased removal of the soil, and the sensitivity to the water erosion is a fundamental part of the spatial and landscape planning.³³⁶ This sensitivity could be caused by the natural and land use factors. The land’s slope grade and orientation together with the volume of the rainfall and its duration are the

³³³ See loc. cit., p. 46 for more details.

³³⁴ They have reviewed the works of Feske (2009), Küchler (2005), Enke (2003), SMUL (2008), and Stock (2003) and cited in the model project’s report.

³³⁵ See loc. cit., p. 70.

³³⁶ See loc. cit., p. 62 for more details.

natural factors and the vegetation coverage especially on the farms and green spaces belong to the land use elements.³³⁷

The capability of the soil in percolating rainwater defines its retention capacity. The low retention capacity of the soil is assumed as a reason behind the water erosion and other risks of heavy rainfalls e.g. flash floods. Therefore, “the climate change impacts, affecting the groundwater renewal processes and increasing the risk of floods, could be intensified with a lower retention capacity of the soil.”³³⁸

5.2.3.3. Vulnerability against flood

The surface water in the form of flood or other overwhelming phenomena can easily destroy the built environment in terms of buildings and urban infrastructures. Therefore, it is essential to be able to predict such phenomena to undertake preventive actions. On the other hand, the uncertainty of such predictions is high and it is difficult to base them on the climate projections. Hence, for the Westsachsen model project, the current and available data have been considered for the future predictions. Based on the available data, more volumes of rainfalls both in summer and winter seasons are projected in Westsachsen Region, but the risks of floods will not increase in winter.³³⁹

The sensitive elements against floods are residential and commercial buildings, physical and social infrastructures, and transportation facilities. In Westsachsen model project, the sensitivity analysis has focused on the socio-economic infrastructures which are critical for the whole region and would negatively affect a large number of inhabitants in the region in case of destruction (Box 5.3).³⁴⁰

³³⁷ See loc. cit., p. 62 for more details.

³³⁸ See loc. cit., p. 64.

³³⁹ See loc. cit., p. 75 for more details.

³⁴⁰ See loc. cit., p. 76 for more details.

Box 5.3: high sensitive facilities and infrastructures against flood in Westsachsen model project

- residential and mixed-functional areas,
- water supply and water operating plants serving more than 2,000 inhabitants,
- water supply areas (water supply wells and sources in drink water protection zone I),
- regionally important roads and transportation paths,
- over regional and nationwide important roads,
- regionally important railway lines,
- over regional important railway lines,
- high-voltage power lines, and
- commercial areas with potential regional importance (more than 3 ha)

Source: adapted from Schmidt, C., Seidel, A. et al (2011), p. 76

The adaptation capacity regarding the floods deals with the damage reduction pertaining especially to the facilities and objects polluting the surface water e.g. sewage treatment plants, in case of being covered by the flood, as well as to the industrial locations with material hazardous to the health.³⁴¹

Based on the model project's report, the socio-economic vulnerability of the region has been concluded through blending the sensitivity of the land use, objects, and infrastructures

³⁴¹ See loc. cit., p. 77 for more details.

with the natural environment exposition.³⁴² Then, the concentration of objects, facilities, and sensitive areas have been analyzed under the title of density analysis in ArcGIS software and with the help of Kernel-Density analysis methods in order to discover regional important concentration areas to recommend special protection strategies for them.³⁴³ “The concentrated areas with very high socio-economic vulnerability are located in Muldenaue and Elbaue in Torgau.”³⁴⁴

5.2.3.4. Vulnerability against decline in water supply in summertime

One of the possible results of temperature increase is the faster evaporation of surface water, which could cause dry seasons to occur and also affect the groundwater resources’ level and availability. This together with a decrease in mean yearly precipitation for the upcoming decades brings about a shortage of fresh water supply. In Westsachsen model project, the climatic water balance has been considered as an indicator in order to predict the risks of dry seasons. The climatic water balance in this region is characterized by a shortage of water availability in the summertime with a simultaneous temperature increase, as the climate projections for 2091 to 2100 highlight.³⁴⁵

The model project considers the less flowing water as a factor decreasing the quality of water and warns of a high sensitivity of surface water against the climate change impacts.³⁴⁶ This sensitivity considers the naturally imposed conditions to the surface water in the region in terms of flowing water and standing water basins. Although, the higher sensitivity against silting up and dry up goes to the backwater basins currently having less depth, but the general sensitivity endangers also the temporary water bodies, small lakes, ponds, water basins, perennial ponds, and natural dystrophic peat waters.³⁴⁷ Another form of sensitivity of the flowing, standing, and groundwater is the one posed by the intensive

³⁴² See loc. cit. for more details.

³⁴³ See loc. cit. for more details.

³⁴⁴ See loc. cit., p. 78.

³⁴⁵ See loc. cit., p. 84 for more details.

³⁴⁶ See loc. cit., p. 85 for more details.

³⁴⁷ See loc. cit., p. 86 for more details.

usage of these resources. This model project warns also of the increasing sensitivity of water resources by using in drink, industrial, mining, and agricultural sectors.

Schmidt, C., Seidel, A. et al (2011, pp. 87-89) conclude in their project report that the vulnerability of the region against a decline in water supply in summertime is understood as the vulnerability of the flowing and standing surface water, which is interrelated with the average low water, sensitive flowing water types, and impacts of the water use.

5.2.4. Recommendations for action

The vulnerability analyses are used as information base for further analysis of sensitive activities and adaptive capacities of potentially affected spatial functions in the region.³⁴⁸ The model project Westsachsen Region completes its vulnerability analyses with planning strategic guidelines in general and recommendations in two categories including formal regional planning procedures and informal activities of other regional actors.³⁴⁹ Table 5.3 highlights a brief description of those strategic guidelines prepared for different parts of the region based on the vulnerability analysis results.³⁵⁰

Table 5.4: guidelines and recommendations for future regional plans in Westsachsen Region

Topic	Results of vulnerability analysis	Strategic guidelines recommended
Vulnerability against heat waves	Parts of the region with high and very high vulnerability against the heat waves	Increasing the proportion of climatic comfort islands in the designated areas especially creating new urban

³⁴⁸ See BMVBS (2011), p. 28 for more details.

³⁴⁹ See Schmidt, C., Seidel, A. et al (2011), p. 182 for more details.

³⁵⁰ There was no report published yet highlighting the practical results of the implementation of these guidelines at the time the present study is concluded.

		forestry or climate and ecologic oriented greenery as well as designing for derelict/vacant lands.
Vulnerability against heavy rainfalls	Parts of the region with high and very high water erosion disposition	<ul style="list-style-type: none"> - Conservative cultivation, - crops with erosion-decreasing capacity, - Catch crops cultivation, - Enrichment of the fields with erosion-decreasing materials, - Changing land use, in steep slope agricultural lands, into forests and green spaces within high vulnerability areas.
	Parts of the region with high and very high retention potential	<ul style="list-style-type: none"> - Securing available forests, and - Increasing retention quality in pure stands through forest conversion.
	Parts of the region with low and very low retention potential	<ul style="list-style-type: none"> - Rain water management in urban areas and deliberately freeing impervious land lots which are no more in use, and

		<ul style="list-style-type: none"> - Increasing the proportion of forests, greeneries, and woodlands (creating long-term land coverage by plants).
Vulnerability against flood	Parts of the region with high and very high protection needs against flood (socio-economic vulnerability)	<ul style="list-style-type: none"> - Special protection of critical infrastructures and existing urban settlements, and - Dike relocation and increasing the retention capacity in flood areas.
	Parts of the region with high and very high protection needs against flood	Issuing no more buildings and land use permissions with socio-economic vulnerability or with conflict potential in flood areas.
	Parts of the region with high and very high conflict potential against flood	Removing existing hazards especially silo installations and industrial units with dangerous materials in flood areas.
Vulnerability against a decline in water supply in summertime	Parts of the region with high and very high vulnerability against a decline in water supply	<ul style="list-style-type: none"> - Taking measures to water retention in affected catchment areas, complementary and selective measures to increase the proportion of woodlands (increasing low water flow through

		<p>simultaneous decrease of total runoff and balanced flowing conditions),</p> <ul style="list-style-type: none"> - Avoiding/reducing the concentration of water wasting functions in affected catchment areas (for example, cumulative resources extraction, water exploitation, irrigation, and water wasting crops), - Taking measures to water retention in concentrated parts of shallow water bodies, and - Adapted surface water usages.
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Source: adapted from Schmidt, C., Seidel, A. et al (2011), pp. 183-186

5.2.5. Conclusions

The recommendations resulted from the climate projections and vulnerability analyses are taken into consideration in future development projects in the region. The climate projections and vulnerability analyses in Westsachsen Region have proved the high risks of heat waves, floods, heavy rainfalls, and shortage in water supply in summertime in upcoming decades. Therefore, the plan making and implementation bodies are bound to match their plans and development projects with the recommended guidelines.

6. Discussions and Results

Chapters 2 and 3 presented the regional planning concepts and its evolution as well as the development planning system in Iran in different levels together with the legal bases for the energy efficiency and environmental protection issues in the national and local levels. Chapter 4 reviewed the case of TMRP as a regional plan in Iran to put it under the magnifying glass and look for the energy efficiency and environmental considerations with respect to the climate protection. Chapter 5 presented the structure of regional planning in Germany and illustrated the case of Westsachsen Region as a good example in dealing with climate relevant problems and vulnerabilities.

The present chapter reviews one more time the research questions posed at the beginning of this study and tries to answer them based on the analysis results and conclusions of the above mentioned chapters.

The research questions considered in this study are as follows:

1. What are the impacts of national energy efficiency regulations on current regional planning model for Tehran Region?
2. What regional planning model is currently being considered for Tehran Region and how this planning model deals with the energy efficiency and climate change impacts on the region?
3. Could the policies and approaches of an international good example be localized and applied in Tehran Metropolitan Region Plan in Iran?

6.1. Regional planning in Iran

The development planning system in Iran, as presented in chapter 2, pays more attention to the national physical and spatial development plans and to the local and county level development schemes, namely master and detailed plans, so the regional level planning as a moderate level of development has, in terms of smaller regions e.g. in the level of a province, not been enough practiced. Although the scientific background of regional planning is strong among the academics and also some officials and experts in local organizations, but the centralized development and budgetary system of the country does not give any room to the regional and metropolitan plans to get realized.

In this situation, a regional plan like the TMRP remains only as a range of regional studies not as a higher-level planning measure binding the counties and local towns to follow a doable guideline conducting a balanced development framework throughout the region. The absence of a regional planning agency or a regional unit with strong authority, able to bind the local municipalities to run their development plans in line with the development priorities of the region, is another weakness of the planning system in Iran.

6.2. Legal bases for energy efficiency and environmental protection

The legal bases for energy efficiency and climate protection do exist in Iran's development planning system. All the acts referring to the protection of water, air, soil, and green areas function as a roadmap on the way of reducing fossil fuel consumption and CO₂ production. The issue of energy efficiency is not a new topic or a new trend in development plans in Iran, but it is mostly considered as a sectoral task for the responsible organizations. There have been lots of activities carried out by different public actors in housing, transportation, industrial, and social sectors e.g. controlling the buildings construction via construction regulations and codes, replacing natural gas as a major energy carrier in all energy consumption sectors, educational programs for children in the schools and also via visual

media, developing electric subway and railways within and between highly populated urban areas, and producing hybrid and dual-firing vehicles.

These examples show that the public awareness of the energy usage and its impacts on the environment has increased over the past decades in Iran. But, the responsible actor organizations act independently, and this creates a policy gap among them in terms of action priorities and projects and also brings about parallel works, as they follow the same national policies with less coordination. Whereas, this does not deny the effectiveness of the national regulations and the efforts of those organizations because the statistics on CO₂ emissions per capita in Iran, between 2000 and 2012, show a very little increase in CO₂ emissions despite a tremendous increase in vehicle per capita as well as in the total number of motor vehicles in the country (see sections 3.8.4. and 3.9.). The energy transition from fossil fuel to the natural gas in residential, transportation, and industrial consumption types are one of the most important reasons behind the little increase in CO₂ emissions in a decade to 2012.

6.3. Tehran Metropolitan Region plan

As a new planning category, the metropolitan region plan was introduced and started for former Tehran Province in 1990s to deal with the problem of informal settlements and environmental pollutions. Having divided the whole former Tehran Province into 8 urban zones excluding Tehran City, the TMRP aimed at redistributing the population of the province among the urban zones based on their capacities and at developing the road networks and reforming the public transport system. The creation of new greeneries and the development of urban forests, to neutralize the urban heat island effects, were also other approaches of the TMRP in land use planning sector. According to the TMRP, all these approaches were to be realized through two prerequisite major tools, which should be first created, namely the integrated development management unit for the populated part of the TMR and the housing council for low-income households in the MHUD (see section 4.7.). The creation of an integrated development management unit for the whole province meant

to merge some of the municipalities of the smaller counties to bring them under the umbrella of the recommended 8 urban zones. This was the beginning point of the conflicts among the municipalities and also between municipalities and the MHUD, as the municipal units did not want to lose their authority over their budgets and territories. Therefore, the outcomes of the plan were neglected because of the local planning hierarchies in the level of towns and counties and of the existing conflicts among the local municipalities (see section 4.8.).

Reviewing the TMRP and its preparatory phases also reveals that the whole process of planning has taken a long period of 8 years from the early constitutional steps to the approval of the plan due to the bureaucratic and interorganizational problems. This shows a very slow-running procedure of plan-making, which together with the regularly changing managers in many parts of the management system put lots of barriers on the way of planning and implementation.

6.3.1. Energy efficiency in the TMRP

Currently there are a variety of regional planning schemes and strategies in different urban and regional development systems in many countries of the world. But what is really important is the extent to which those strategies refer to the climate change and climate protection aspects, which are currently the global problematic and critical issues, and the level of efficiency up to which they perform. As concluded in chapter 4, the TMRP is a regional plan which deals with the energy efficiency and climate protection issues indirectly and in the form of reformations in land use planning policies, development of transportation networks and facilities, and creation of new green spaces in the metropolitan region together with the development of existing greeneries. All these approaches have been planned as to respond to the problem of informal settlements, in and around Tehran City, and to the environmental pollutions resulted from that. Therefore, these approaches have not been planned based on the problem identifications relevant to the climatic changes affecting the region, e.g. droughts, mean precipitation decrease, or mean temperature

increase during recent decades, but based on the environmental pollutions caused by the population congestion and roads network insufficiency.

6.4. Westsachsen Region; a climate adaptive regional model

Based on the climate projections, Westsachsen Region would confront with more hot days and less precipitation at the end of current century. According to the climate projections resulted from the comparison of climate records of the last decades, this region would be up to 3° C warmer and have up to 15 percent less precipitation during the period of 2091 to 2100. These changes would bring about the higher risks of heat waves and decline in freshwater supply in summertime as well as of heavy rainfalls and floods in the region.

The reactions of the natural and living environment against these changes have been considered in vulnerability analyses carried out by the regional planning association in Westsachsen. The risk factors of the climate change impacts and the sensitivity of the natural and social environments together with the capacities for impact reduction and the risks caused by the vulnerabilities of the region against the risk factors are the major themes of the conceptual framework for the analysis. The model project Westsachsen has made some recommendations based on the results of vulnerability analysis.

The core area of the recommendations include the development of urban forestry, conservative cultivation, enrichment of the fields with erosion-decreasing materials, increasing retention quality of the soil, rain water management, protection of infrastructures and existing settlements against flood, and adapted usage of the surface water (Table 5.4).

6.5. Critical comparison

6.5.1. Fundamental differences

Regional planning in Germany is understood as a tool of development coordination within and among the regions in a state as well as regions located between two or more different states. The FSPA binds all the states to prepare a state spatial plan and a regional plan for the regions with more urban centers. These plans follow similar development policies in urban centers based on the local capacities. The most important outcome of this planning system would, automatically, be a balanced development in central places across a region in terms of physical and social infrastructures. Those central places could be located in a region within a single state or cross the borders of several states. But the regional planning in Iran in terms of metropolitan region plan, as of for Tehran Province, inherently, isolates a province from the neighbor provinces and looks at a province as a single unit of metropolitan region to be planned for. In case of TMRP, there was very little attention paid to the urban centers as to develop the physical infrastructure within their core and surrounding areas and the development policies had focused mostly on population redistribution.

In addition, the structure of regional planning and implementation in Germany gives the possibility of participation to all local and regional actors including the public agencies to take part in the plan-making processes (see section 5.1.3.). The existence of regional planning associations³⁵¹, in some states, is another significant characteristic of this planning system because the planning associations could make regional plans themselves too. This brings about a unity in local and regional plans and binds the local authorities to follow the guidelines of the plan in all development activities. Whereas, the metropolitan planning framework in Iran was based on a single act³⁵² (see section 4.5.) ratified to resolve some specific problems in Tehran Province and devolved the plan-making process to an external

³⁵¹ Regionale Planungsverbände

³⁵² Planning and management of Tehran Metropolitan Region and the country's other large cities and their suburbs act of 1995.

planning body, whose final approaches were neglected by the local municipalities despite the approval by the HCUDA and cabinet of ministers.

The FSPA in Germany requires all the states to have spatial and regional plans and flexibly grants them the freedom to match the plans to their political and management structure no matter which political division or structure they have. For example, in Mecklenburg-Western Pomerania the state administrative authorities could be responsible for the spatial planning, but in Brandenburg the local government in the form of regional planning associations could be in charge of the regional planning.³⁵³ The flexibility and inclusion together with the mandatory and binding nature of the regulations give the states the room to practice their own spatial planning programs in line with the federal spatial planning policies. But the development regulations pertaining to the regional planning in Iran are mostly problem-based movements meaning that whenever there has been a need for planning in a region in the country, the cabinet of ministers or later on the HCUDA have ratified a bill and passed the duty to the planning sectors, which were not necessarily any part of the target region, to prepare a regional plan. This has been proved several times for Tehran Province as well as for Eşfahān, Širāz, Mašhad, and Tabriz. These plans have been prepared by consulting engineers firms and are supposed to be implemented by the local governments. Although the MRPs are approved by the deputy minister for architecture and urban development in the MRUD, but there are lots of barriers on the way of their implementation. These barriers include the variety of plans in local municipalities, namely the master and the detailed plans binding the municipalities to follow the guidelines, existing conflicts among the local municipalities due to the political and budgetary priorities, and the lack of formal and organizational bases for the acceptance of the MRP's recommendations.

³⁵³ See Pahl-Weber, E., Henckel, D. (eds.) (2008), p. 76 for more details.

6.5.2. Climate adaptation

Climate studies and vulnerability analyses are parts of an up-to-date regional planning model today. Another factor differentiating the two regional planning models in the TMR and Westsachsen Region is the existence of these analyses and the attention of regional planning association in Westsachsen Region to this phenomenon. Taking the impacts of the climate change on the region very seriously, the regional planning association has also recognized the vulnerable parts of the natural environment as well as social groups against the long-term impacts of the climate change and has also tried to recommend appropriate approaches. All these approaches would be taken into account in the processes of updating the regional plans in the future, and bind the local actors to act accordingly. But in the TMR there is no little attention paid to the climate change impacts on the region. Although the plan belongs to the last two decades, but there have also been no updates in this respect during the recent years. Whereas, the TMR suffers from the negative impacts of the climate change and the situation could get worse in the near future and increase the vulnerabilities of different natural and social elements (Table 6.1). For example, many of the metropolitan regions in Iran, including TMR, have been facing fresh water shortages and limitations on water supply in residential, industrial, and agricultural sectors in recent years. The volume of the surface water in the form of lakes and stagnant watersheds have also declined in different parts of the country, namely in Orumiya Lake in northwest, Hāmun Lake in southeast, and Baḳtegān Lake in south of Iran.

Another difference in the field of climate studies in both case studies is the manner of dealing with the impacts of climate change. In case of Westsachsen Region, the main orientation is the climate adaptation planning meaning that the region should get ready for the further changes of the climate and have conscious planning and implementation tools according to the impacts of the climate change. Whereas, in case of TMRP, the little attention paid indirectly to the issue of energy efficiency is assumed as an attempt to mitigate the climate and reduce the emissions of fossil fuel usage.

Table 6.1: current and future vulnerabilities of the natural and social environments in the TMR
against the climate change impacts

Climate change impacts	Vulnerability
Mean yearly precipitation decrease	Critical shortage in water supply
Heavy rainfalls	Flashfloods
Mean yearly temperature increase	Number of the days with more than 30° C in a year

Source: own conclusions

6.6. Facilitators and inhibiting features on energy efficiency purposes in the TMRP

6.6.1. Central decision-making

There is a wide gap between the urban management executive bodies e.g. all the local municipalities and local governors in the region and the ministerial organizations carrying out the energy efficiency and environmental policies (see figure 6.1, columns A and B). As the figure shows, the regulations pertaining to the environmental protection and EE (see section 3.8.2.) are designed by the law-makers and are passed to the ministries and national executive organizations (column B). These ministries implement the policies in all provinces and namely in all counties through their local administrations and representative offices, as the level of implementation is the local county level. The ministries have a sectoral nature and function, creating their own local branches throughout the country and running a top-down decision-making and implementation structure through their local representatives.³⁵⁴ Therefore, the centralized policy-making and the sectoral implementation framework make the urban management system more fragmented.

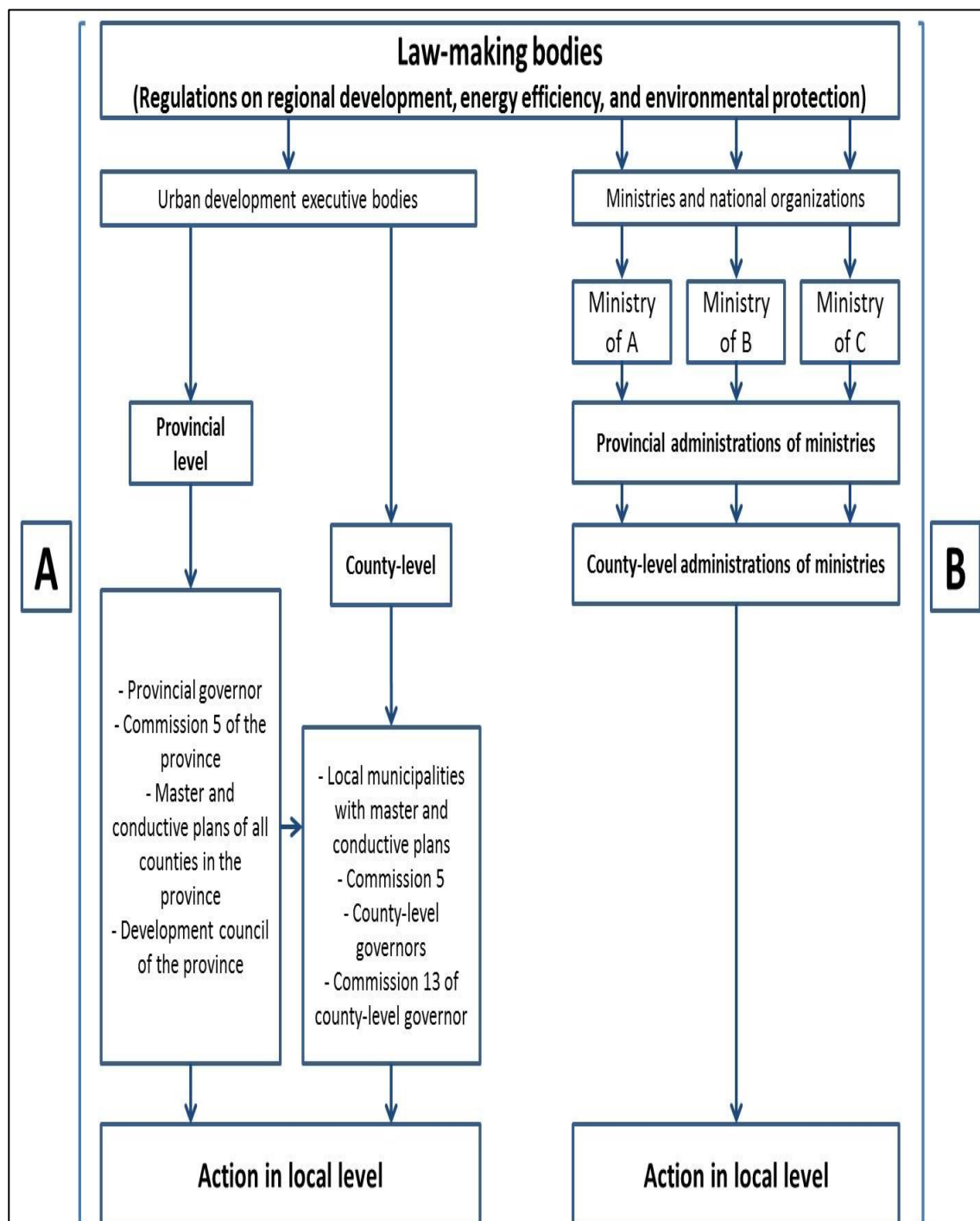
³⁵⁴ See Saeedi Rezvani, N., Kazemian, Gh. (2002), pp. 65-66 for more details.

6.6.2. Local urban management structure

Another inhibiting feature on EE in the TMRP is the local urban management structure. There is no independent urban management organization in regional or provincial levels and the existing units are the provincial bodies of the national organizations acting in the province.³⁵⁵ The municipalities and the provincial and county-level governors are also examples of the top-down decision-making and implementation framework. They implement the urban development plans based on the master, detailed, and conductive plans as well as the decisions made by the commissions 5 and 13 of the municipalities and county-level governors (column A). Therefore, the creation of the gap between the two groups of the actors is, somehow, the direct outcome of the centralized management system. It means that the ministries follow the national regulations and their own guidelines in local level independently and their coordination with the municipalities is very low and only to the level of small scale infrastructural projects. But the other large scale development projects, which must be run according to the master and detailed plans, are the task of the municipalities. In this situation, the energy efficiency and environmental policies would be limited to the activities of the ministerial organizations and could not be inserted to the large scale development plans conducted by the master and detailed plans. Moreover, the master and detailed plans deal mostly with the land use policies in terms of highlighting the future development priorities in a county or city, and do not necessarily consider the energy efficiency of the physical developments.

³⁵⁵ See loc. cit., p. 82 for more details.

Figure 6.1: the gap in relationship among urban management bodies in the TMR



Source: adapted from Ghammami, M. et al (2007), p. 22

6.6.3. Lack of horizontal relations among local authorities

The cities in Iran are lacking a coherent and integrated urban management system, and all the management units within them are merely functioning based on their own sectoral guidelines with the lowest horizontal cooperation with other parts.³⁵⁶ On the other hand, the climate protection and the adaptation of regional plans to the climate change impacts and the implementation of them requires multi-level governance in regional and local levels. The multi-level governance is a framework which helps to understand the complicated interactions between different levels of government through its vertical and horizontal cooperation concepts in order to narrow the policy gap among all the levels and to improve the implementation of policies related to the climate change.³⁵⁷ Therefore, the gap between the “A” and the “B” columns in the figure above must be bridged through a horizontal linkage.

6.7. Conclusions

The TMR lacks an integrated urban management system which could be able to prepare and implement a regional plan with the participation of all local municipalities throughout the province. The major recommendation of the TMRP could also not be implemented due to the organizational problems and legal bases (see sections 4.7. and 4.8.). Furthermore, the absence of a comprehensive study relating to the climate change impacts on the region and to the climate adaptation strategies to be taken into account in the TMRP shows that the climate impacts and the adaptation strategies have been neglected in regional levels so far. These deficits together with the lack of horizontal relations among governmental bodies in local level bring about the necessity of reviewing the structural framework of urban management system in TMR in order to find any legal possibility to insert the climate considerations as well as to create a horizontal linkage among the local authorities.

³⁵⁶ See loc. cit., p. 134 for more details.

³⁵⁷ See OECD (2010), p. 172 for more details.

6.7.1. Capacities in local urban management bodies

There are several opportunities within urban management bodies in provincial level in Tehran Province, which could potentially play the role of central policy-making and decision-taking unit within the region as the first step towards the creation of integrated urban management system. One of them is the province's *council of planning and development*, which is located in the governorate. This council is in charge of the decision-taking in development planning for the province and also coordinates and monitors the planning procedures in the province in line with the national development policies.³⁵⁸

Another opportunity refers to the legal bases for preparation of a province-based as well as cross provincial regional plans. The first one is the *provincial development plan document*³⁵⁹ which is suggested by the 4th 5-year development plan. This document is part of the national territorial spatial plan, which should be prepared for the provinces and should include the development priorities as well as the most important actions to consider.³⁶⁰ The climate change impacts on the regions and the policy adaptations to new climatic conditions could be considered as particular important actions for the regions like TMR and could be inserted into the development plans. The second opportunity in the form of legal basis is the article 77 of the 4th 5-year development plan. This article allows the government to regionalize the country based on the spatial planning viewpoints and to create coordinative units in supra-provincial levels in order to coordinate the development affairs between the provinces.³⁶¹

³⁵⁸ See Article 70 of the 3rd 5-year development plan of the Islamic Republic of Iran for more details.

³⁵⁹ *The provincial development plan document is a strategic document identifying and defining the most essential approaches towards population and manpower, the infrastructures and economic, social and cultural as well as the long term and medium term quantitative and qualitative objectives for development of the provinces within the framework of the macro-strategies of the fourth plan and the national territorial/spatial plan documents and development plans and the national sector development plans in due consideration of the potentialities, restrictions and the impediments towards provincial development.* Section B of the article 155, 4th 5-year development plan of the Islamic Republic of Iran.

³⁶⁰ See section C of the article 72 of the 4th 5-year development plan of the Islamic Republic of Iran for more details.

³⁶¹ See Article 77 of the 4th 5-year development plan of the Islamic Republic of Iran for more details.

6.7.2. Capacities in Department Of Environment (DOE)

The DOE in Iran could be another opportunity to carry out climate change impact analysis in regional levels. The DOE, as a coordinative central organization³⁶², is a deputy president organization in charge of protecting the environment, and the dean of the organization holds the vice presidency position in environment protection sector. The DOE has three main deputies including marine environment, natural environment, and human environment. Under the deputy of human environment, there are two offices responsible for monitoring the air pollution and the climate change effects, namely the *national climate change office* and the *national center for air and climate change*³⁶³ (see section 3.8.3. and figure 6.2). These two units are in charge of investigations on climate change impacts and the vulnerability analyses as well as on air pollution and quality. The national climate change office was established in 1998 in the DOE. The office submitted its first report on climate change impacts and the vulnerability analyses of natural and social environments in Iran to the UNFCCC in 2003 and its second report was submitted in 2010.³⁶⁴ The center for air and climate change is also in charge of setting standards for energy usage and its pollutions, defining strategies in three sectors of air, noise, and energy, and also carrying out studies on the new technologies related to the air pollution.

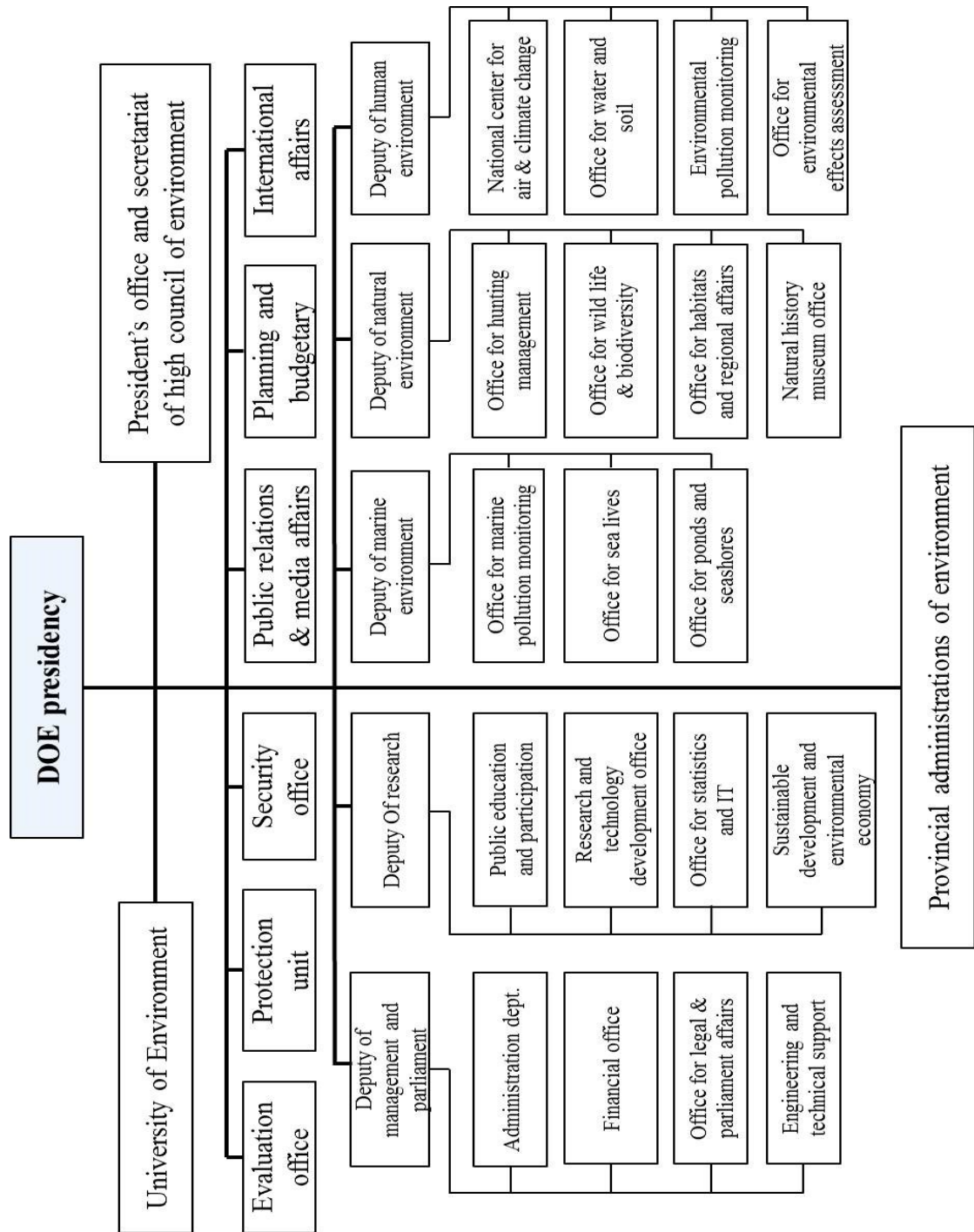
These two units in the DOE could be having the potential capability of playing more pragmatic role in assessing the short and long term impacts of the new climate conditions specific to the TMR. Another task which could be carried out by these two units are the climate projections for upcoming decades in order to enable the vulnerability analysis for natural and social environments, regarding the risk factors posed by the climate conditions, in the TMR.

³⁶² The government, as the executive body, is the administrative and executive macro system leading the urban management bodies and consists of three major parts including ministries, coordinative central organizations, and the municipalities. The coordinative central organizations are to coordinate sectoral activities of the ministries and are in the level of vice presidency in the whole structure of government. See Saeedi Rezvani, N., Kazemian, Gh. (2002), pp. 65-66 for more details.

³⁶³ This center is a subdivision of *deputy of human environment* in the DOE in Iran.

³⁶⁴ Adapted from the official homepage of the Department of Environment at www.doe.ir/Portal/home/?120370/ on 10.02.2015.

Figure 6.2: organizational chart of the DOE



Source: adapted from the official homepage of the DOE³⁶⁵

³⁶⁵ <http://www.doe.ir/portal/Home/Default.aspx?CategoryID=2158e0bf-c2ba-4227-a155-9417c94cdf48>
accessed on 20.04.2016.

6.7.3. Bridging the gap

Although the gap between the two groups of national and local authorities (see figure 6.1) refers to the urban management issues, in terms of coordination of development policies and priorities as well as organizational independency in local level, but the negligence of climate considerations in the TMRP reveals also that there is a lack of cooperation between plan-making local authorities and the organizations working on climate issues and research institutes. The both gaps could be bridged by the DOE because, first, it is a coordinative organization in its nature, and second, it has the capacities of dealing with climate related investigations as well as vulnerability analyses for the TMR and other large metropolitan areas in Iran.

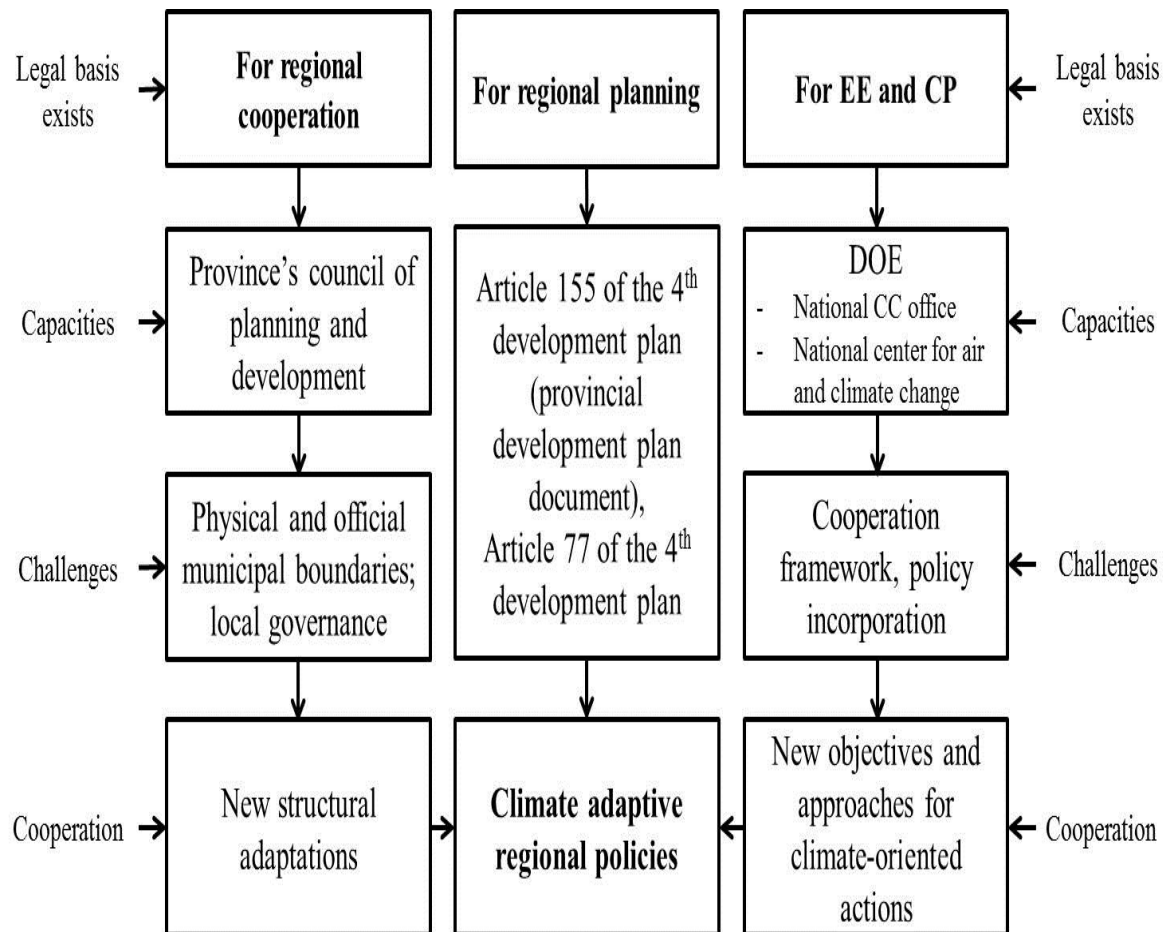
6.7.3.1. New responsibilities

Planning procedures for climate adaptive regional development for the TMR should be brought under a single umbrella. The centralization of plan-making for this region could coordinate all the activities carried out by the local ministerial and municipal authorities and narrow the gap mentioned above. As the figure 6.1 shows, the province's council of development and planning, as a capacity in urban management system, could act as the sole coordinative unit in the TMR, playing the role of what the regional planning association in Westsachsen Region in Germany plays. This council is headed by the governor-general in Tehran Province and the legal bases giving the responsibility of coordination of development plans to this council is the article 70 of the 3rd 5-year development plan. This council could play the role of moderator among all local responsible authorities and bring them together to unify their development priorities in line with the climate mitigation and adaptation policies.

This council could make use of the provincial development plan document, legalized in section C of the article 72 of the 4th 5-year development plan, as a tool guiding the development policies in the province. It could also involve the DOE to carry out

investigations related to the climate change impacts on the region to be incorporated into the planning priorities.

Figure 6.3: possible utilization of the existing legal and institutional capacities for CA strategies in the TMR



Source: own design

6.7.3.2. New roles for the DOE

The scientific and comprehensive investigations into climate change impacts on the region and the climate projections for the future are the tasks of DOE in Iran. The DOE is a coordinative organization having the potential of acting between the ministerial units and the urban management authorities in local level. This coordination refers mostly to the environmental considerations and monitoring. The DOE, with its both offices namely the national climate change office and the national center for air and climate change, could play the role of leading unit carrying out climate related studies and recommending the climate adaptive strategies to be taken into account in planning procedures for the region. The specific action priorities for the DOE could include the investigations into the risk factors, posed by the climate change, and the vulnerable natural and social elements against them in the short term. The climate projections and the vulnerability analyses could also be carried out in order to recommend adaptation policies for the long term.

6.7.4. Further research and open questions

The capacities mentioned in figure 6.3 and the possible new cooperation concept stated in sections above could be deeply questioned. As this concept has been developed based on the reviews made on the constitutional frameworks and the case study in Iran, it is more or less a theoretical statement and like many other recommendations has an analytical background and a desired future, so it does not claim the success of the concept in practice. Furthermore and from the administrative and technical point of the view, further investigations must be carried out if such a concept is going to be planned and implemented. Therefore, a series of possible challenges on the way of implementing this concept and a sort of open questions posed are shortly discussed here.

One of the challenges the province's council of development and planning could be facing is the local municipalities and the city master and detailed plans. Prioritizing the development policies and getting all the local ministerial units' agreement to those policies

could be another challenge of the council. Therefore, there are some thematic questions open for further studies as follows:

- How should the term “coordination of regional development” be defined and what features should it cover?
- How could the municipalities participate and what are they expected to contribute?
- How should the master and detailed plans, which lots of the cities in the region possess, be integrated into the new form of regional planning coordination?

There would also be challenges on the way of involving the DOE in planning procedures. The challenges here include the framework for the cooperation between the DOE and the province’s council of development and planning as well as the incorporation of the adaptation strategies into the regional development plans. Following are the questions posed in this respect:

- How could the cooperation framework between the DOE and the council of development and planning in Tehran Province be arranged?
- How would the climate adaptation strategies be incorporated into the TMRP or any other plan in regional level?
- Should the climate adaptation strategies, recommended by the DOE, be binding for the council and other actor bodies in the region?

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Appendix: Interview guidelines

General framework

Interviewing with related experts worked on the TMRP in public and private sectors was an important tool to collect accurate information for the present study. The interviewees were selected from the urban planning departments of the MRUD, local municipalities in Tehran Province, the UPARC, the DOE, the MRMO, and the University of Tehran. The selection criterion was the relevance of the department, in which the interviewee was engaged, to the TMRP and the role of interviewee in different phases of the preparation of metropolitan plan for Tehran Province from the early stages to the time of ratification. Some of the interviewees have also not taken any part in planning phases but have rather witnessed the results of the plan in terms of implementation. A question-based open-end discussion has been employed for the interviews, following the main themes of research questions. All the interviewees were visited several times during the data collection period for this study in order to update the information and to discuss the new questions and challenges resulting from the discussions with other interviewees.

Interviewees

The interviewees selected for the interviews belonged to three major sectors including the public sector, private sector, and the research institutes and they have been listed below in A, B, and C parts.

Topic coverage

The questions posed to the interviewees varied from the reasons behind the necessity of preparing the TMRP to the quality of planning processes and the outcomes of the plan. The structure of the questions and the relevance of each question to the interviewee were based on the objectives of the interview. For example the interviewees in MRUD were asked

about the nature of the TMRP and what problems was it going to solve, its objectives, and the topic coverage of the plan as well as the tools to implement the plan. They were also asked about the importance of the energy efficiency concepts in the plan and if it had been considered in the plan at all. On the other hand, the interviewees in the DOE were asked to highlight the constitutional framework of the DOE and its functions pertaining to the regional planning attempts in Tehran Province as well as to the TMRP. They were also asked about the policy priorities of the DOE in dealing with the environmental pollutions especially in Tehran Province. The relationship between the DOE and other public sector organizations, responsible for development planning in Tehran Province, was another topic included in the interviews.

The interviewee in the MRMO was asked about the function of his organization and the relationship between the structure of the urban-rural connectivity – and the management network functioning as a controlling tool monitoring the development plans in urban and rural areas – and the objectives of the TMRP. Another topic discussed with the interviewee in the MRMO was the challenges of implementation of the TMRP for the local actors and how those challenges should be dealt with.

The main topics discussed with the interviewees in the governorship and the municipality of Pākdašt County included the geographic and political divisions of the counties in the province in terms of planning and development management. The existence of any kind of bilateral projects or any coordination and cooperation among the counties was another topic discussed with the interviewees.

The UPARC, as the responsible body for the preliminary and main studies of the TMRP, was the major source for the contents of the TMRP, as it had run the whole phases of the preparation of the plan. Together with the University of Tehran, the UPARC acted the role of scientific partner for the author of this study and provided the author with the useful documents and information.

List of interviewees

A. Public sector

1. The MRUD

- Mr. Dr. Hanachee, former and current deputy minister for architecture and urban development in the MRUD, 22.05.2012,
- Mrs. Parvand, office for physical planning in the MRUD, 17.05.2011,
- Mrs. Dr. Davoudpour, office for monitoring urban development plans, MRUD, 18.05.2011, and
- Mr. Ing. Mohammadian, office for national construction codes, the MRUD, 17.05.2011.

2. The DOE

- Mrs. Fariba Rezayi, Tehran Province department of environment, 14.05.2012, and
- Mr. Ahmad Ebrahimi, Tehran Province department of environment, 14.05.2012,

3. The MRMO

- Mr. Dr. Ali Iranshahi, the vice manager of inspection and monitoring dept., the MRMO, 29.04.2012.

4. Governorship and Municipality of Pākdašt County

- Mr. Ing. Mohammad Reza Talebi, governorship of Pākdašt County, 15.06.2010,
- Mr. Ing. Abolfazl Najafi, governorship of Pākdašt County, 15.06.2010,

- Mr. Ing. Baybordian, municipality of Pākdašt County, 24.06.2010, and
- Mr. Ing. Samiei, municipality of Pākdašt County, 24.06.2010.

B. Private sector

1. The UPARC

- Mr. Ing. Sepehri, head of the center, 13.05.2012,
- Mrs. Ing. Nasiri, head of the archive center, 13.05.2012, and
- Mr. Dr. Saeid Izadi, board of managers, 19.05.2012.

C. Research institutes

1. University of Tehran

- Mr. Dr. Mehdi Azizi, head of the faculty of fine arts, University of Tehran, 10.05.2011,
- Mr. Dr. Asadi, University of Tehran, 11.05.2011, and
- Mr. Dr. Qader Ahmadi, University of Tehran, 11.05.2011.