



# Implementation of Renewable Energy in the Republic of Moldova

- SOCIETY AND LANDSCAPE IN TRANSITION



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MASTER THESIS IN LANDSCAPE PLANNING  
DEGREE PROJECT 30 HEC  
ALNARP 2010



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# IMPLEMENTATION OF RENEWABLE ENERGY IN THE REPUBLIC OF MOLDOVA

- society and landscape in transition

Implementering av Förnyelsebar Energi i Moldavien  
-samhälle och landskap i förändring

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Degree Project: 30 ECTS  
Advanced level: II  
Master Thesis in Landscape Planning (6X054)  
Landscape Architecture degree program

Place and year of publication: Alnarp 2010  
Cover photo: by Annelie Kjellberg

Electronic publication: <http://stud.epsilon.slu.se>

Keywords: renewable energy, energy, Republic of Moldova, society development, Lozova, culture, planning, biomass, wind power, solar energy.

Nyckelord: förnyelsebar energi, energi, Moldavien samhällsutveckling, lozova, kultur planering, biobränsle, vindkraft, sol energi.



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## ABSTRACT

The Republic of Moldova is situated in eastern Europe and a former part of the Soviet Union. It is currently experiencing a phase of transition in both society and landscape. There are fossil fuel deposits and they are currently dependent on Russian gas, with 97% of energy needs imported. The new elected government wants to move towards the EU and this is generally seen as the way to grow and reduce poverty. Security in the energy sector is important and one of the goals is the use of renewable energy sources.

Through interviews, texts and visits I have studied the implementation of renewable energies in Moldova through a society development perspective. The study has aimed to investigate the social and technical complexity of this subject and to discuss the potentials and way of dealing with the subject in the specific cultural context of Moldova. In my local interviews I have focused on the village Lozova.

The biggest potential in RE in Moldova lies in biomass: agricultural residues and wood. Solar energy also has a large potential. Technologies implemented need to be effective, inexpensive and comfortable. The main barriers are the immense interest rates and political instability making it difficult to plan long term. The main resources are the human resources. Moldova has a well educated population with many international experiences.

Uncertainty and risk are relatively high in a collectivist society with a strong hierarchy. Avoiding uncertainties and risks needs to be considered.

## SAMMANFATTNING PÅ SVENSKA

Moldavien ligger i östra Europa och var tidigare en del av Sovjetunionen. De är nu i en fas av förändring i både samhället och landskapet. De har i stort sett inga fossila tillgångar närvarande bortsett från de av rysk gas. De importerar 97% av sitt energibehov. Den nyvalda regeringen vill närma sig EU och detta ses generellt som vägen att gå för att skapa tillväxt och minska fattigdomen. Det är viktigt att skapa energisäkerhet och ökad mängd förnyelsebara energikällor.

Genom intervjuer, texter och besök har jag studerat implementeringen av förnyelsebara energier i Moldavien ur ett samhällsutvecklingsperspektiv. Studien har syftat till att utforska den sociala och tekniska komplexiteten och att diskutera potentialen och hur man kan hantera i den specifika kulturella kontexten i Moldavien. I mina lokala intervjuer har jag fokuserat på byn Lozova.

Den största potentialen finns i biomassa: halm, andra jordbruksrester och hamling. Solenergi är också lämpligt. Teknologier som införs behöver vara effektiva, billiga och bekväma. De största barriärerna är höga räntor och den instabila politiska situationen som gör det svårt att planera långsiktigt. Den största tillgången är humankapitalet. Moldavien har en välutbildad befolkning med internationella erfarenheter.

De kulturella dimensionerna bör respekteras när man arbetar internationellt. Moldaviens relativt konservativa och hierarkiska samhälle med en stark hierarki och osäkerheter och risker bör beaktas.

## FOREWORD

The work with this thesis has been a journey, both geographically and personally. I have grown professionally, increased my knowledge and gained a big network in Moldova and good friends.

## ACKNOWLEDGEMENTS

Although I have made this study individually I have hardly been on my own. My supervisor my university Anders Larsson has been a great support, giving important advice at the right time. Ronny Arnberg at Borlänge Energi has shown great confidence in me and removed gap between the academic world and the professional world. My translator Sergeo Ongriana has followed me around providing a linguistic and cultural translation as well as technical information My assistant supervisor Karin Hammarlund, my technical student Sergiu Robu in Moldova and numerous others in Moldova as well as in Sweden have taken their time to guide me in my work, provide information and help me with practical issues. Thank you!



## TABLE OF CONTENTS

Abstract.....	3	Energy use in village.....	27
Sammanfattning på Svenska.....	3	Domestic use of energy.....	28
Foreword.....	4	<i>Renewable Energy in Moldova</i> .....	29
Acknowledgements.....	4	Renewable Energy Today.....	29
Table of Content.....	5	Ongoing Projects.....	31
Abbreviations.....	7	<i>Politics and Governance</i> .....	32
Introduction.....	9	Organization.....	32
<i>Background</i> .....	9	Political Instability.....	32
About Moldova.....	9	Corruption.....	32
About the need to address the topic.....	9	Legislation.....	32
<i>Aim and Objectives</i> .....	10	<i>Mentality and Acceptance</i> .....	34
<i>Method</i> .....	10	Mentality, Heritage.....	34
<i>Focus</i> .....	13	Acceptance.....	35
<i>Structure of the thesis</i> .....	14	Cooperation.....	36
Theory.....	17	<i>Market</i> .....	36
<i>Definition of Renewable Energy</i> .....	17	<i>Economy</i> .....	36
<i>The Cultural Dimensions of Management and Planning</i> .....	17	<i>Migration and Youth</i> .....	37
1. Collectivism / individualism.....	17	Issues to consider.....	39
2. Large / small power distance.....	18	Lack of resources.....	39
3. Strong / weak uncertainty avoidance.....	18	Indoortemperature and health.....	39
4. Masculinity / femininity.....	18	Litter.....	39
<i>Decentralization and Democracy</i> .....	18	Issues concerning agricultural land... ..	40
Present Situation in Moldova.....	21	Shortage and low quality of water... ..	40
<i>Geography and Demography</i> .....	21	Deforestation.....	41
<i>Physical Structures</i> .....	24	Example of failed project.....	41
Land use.....	24	Inflation.....	42
Village structure.....	26	Migration.....	42
Infrastructure.....	27	Climate for investment.....	42
<i>Energy Use</i> .....	27	Transnistria.....	42
		Political instability.....	42
		Culture.....	43
		Gas the only alternative given.....	44
		Awareness.....	44
		Promotion.....	44
		Bureaucracy and corruption.....	44
		Discussion of Possibilities how to work with these issues.....	47
		<i>Moldovan Culture in Management and planning</i> .....	47
		Degree of Collectivism in Moldova....	47
		Hierarchical System.....	47
		Avoiding Uncertainties and Risks.....	48
		Cultural Values.....	48
		<i>Resources</i> .....	49
		Human Resources.....	49

Physical Resources.....	49
Biomass.....	49
Sun, Wind and Water.....	51
<i>The Landscape</i> .....	52
Land consolidation.....	52
Reforestation.....	53
Lively landscape.....	54
The European Landscape Convention	54
<i>The National Level</i> .....	55
Energy security.....	55
Decentralization and Democracy.....	56
<i>Solving the situation for the single household</i>	56
<i>Keys to implementation</i> .....	57
<i>The Future</i> .....	58
Lozova an example.....	61
Final Conclusions.....	65
Reflections.....	67
<i>Personal reflections</i> .....	67
<i>Reflections on method</i> .....	68
About getting information in Moldova	68
Working with a translator.....	69
Recording interviews.....	69
Bibliography.....	71
<i>Published sources</i> .....	71
<i>Internet sources</i> .....	72
<i>Oral sources</i> .....	72
Lozova, Straseneni district.....	72
Other.....	73
<i>Pictures</i> .....	74



## ABBREVIATIONS

ANRE	National Agency for Energy Regulation	RM	Republic of Moldova
ASM	Academy of Sciences of Moldova	SEK	Swedish krona (Swedish currency)
CAPMU	Consolidated Agricultural Project Management Unit	Sida	Swedish international development cooperation agency
CBM	Swedish Biodiversity Centre	TUM	Technical University of Moldova
CDM	Clean Development Mechanism	UD	Ministry of Foreign Affairs, Swedish Government
DNA	Designated National Authority	UN	United Nations
ELC	European Landscape Convention	UNDP	United Nations Development Programme
ENP	European Neighbourhood Policy		
ESTI	European Solar Test Installation		
EU	European Union		
GDP	Gross Domestic Product		
IEA	International Energy Agency		
MDL	Moldovan leu (Moldovan currency)		
mtoe	Million tonnes of oil equivalent		
NGO	Non Governmental organization		
NLP	National Land Program		
PCF	Prototype Carbon Fund		
PV	Photo Voltaic		
RE	Renewable Energy		
REAW	Renewable Energy from Agricultural Waste (Project)		
RES	Renewable Energy Sources		







## INTRODUCTION

### BACKGROUND

The suggestion of studying renewable energy (RE) in Moldova was posted on internet by Borlänge Energi. The municipality of Borlänge has a twinning agreement with the municipality of Chisinau since 2008. Borlänge Energi had environmental engineers in mind for the task but I saw the need to address this subject as a landscape planner. Moldova is situated in a region that I find highly interesting. I found Moldova is a place full of activity and in an important phase of transition. The society is in a period of rapid change at all levels. Especially interesting to me is what is happening in the sector of energy. The present situation is both sustainable and unstable. I think that we will see a big conversion within this field and I would like to be part of that process.

### ABOUT MOLDOVA

Moldova was earlier a part of the Soviet Union but on the 27<sup>th</sup> of August 1991 they became independent. During the 90's an extensive privatization took place. Moldova is an agricultural country and after the privatization they had problems establishing a new market to work for the agricultural products within the new system. The production fell dramatically and this led Moldova into a severe financial crisis. Moldova is today the poorest country in Europe. The economy is starting to recover but the situation has degraded the energy system.

FIGURE 1: PHOTO FROM LOZOVANNEKJELLBERG

<sup>1</sup> Republic of Moldova, 2009, 902  
<sup>2</sup> Cernea, 2008  
<sup>3</sup> Sida, 2007

### ABOUT THE NEED TO ADDRESS THE TOPIC

Moldova has a limitation in its resources. They have practically no fossil deposits. They cannot produce any amounts of their own natural gas, oil products or coal to speak of. During the Soviet time resources in the union as a whole were abundant. This has put Moldova in a dependency situation with 97% of its energy imported, almost exclusively from Russia.

Moldovans now find themselves in a totally new situation. The new elected government wants to move towards EU and it is generally seen as the way to grow and reduce poverty. Sida, the Swedish international development cooperation agency, in Moldova encourages this in their cooperation strategy valid in 2009. The dependency on Russia is then seen in a



FIGURE 3: MOLDOVA IN THE USSR, AVAILABLE AT [HTTP://COMMONS.WIKIMEDIA.ORG](http://commons.wikimedia.org), 20100426. EDITED BY ANNELIE KJELLBERG



FIGURE 4: MOLDOVA IN THE EU, AVAILABLE AT [HTTP://COMMONS.WIKIMEDIA.ORG](http://commons.wikimedia.org), 20100426. EDITED BY ANNELIE KJELLBERG

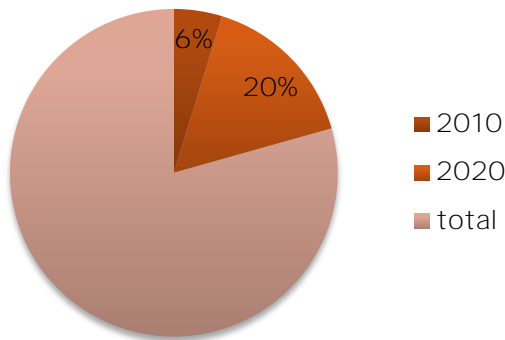
<sup>4</sup> Climate Change Office, 2008

<sup>5</sup> Min. of Industry and Infrastructure, Moldova, 2007, Climate Change Office, 2008

<sup>6</sup> Sida, 2007

A different light. An aim set up by the Moldovan government is to create an energy security for the country. One strategy is to import energy from more than one source. This strategy needs to be supplemented with producing their own energy. Like the EU, Moldova has set up the goal to have 6% renewable energy sources (RES) until 2010 and 20% RES until 2020. The options for renewable energy sources are limited. There is very little wind and few rivers. The energy sector is a key of the Moldovan economy and is important for maintaining social stability.

% RES IN TOTAL ENERGY CONSUMPTION



According to Corneliu Marza, current minister at the Ministry of Environment in Moldova, Swedish specialists have difficulties understanding how it works in Moldova and it is not possible to do something new.

### AIM AND OBJECTIVES

This study is my master thesis in my education in landscape architecture with the profile of planning.

My objective has been to study the implementation of renewable energies through a society

<sup>7</sup>Min. of Industry and Infrastructure, Moldova, 2007  
<sup>8</sup>Min. of Industry and Infrastructure, Moldova, 2007  
<sup>9</sup>Min. of Industry and Infrastructure, Moldova, 2007  
<sup>10</sup>Ecosfera, REC Moldova, meeting 2009

development perspective. The study has aimed to investigate the technical complexity of this subject and to discuss the potentials and way of dealing with the subject in the specific cultural context of Moldova.

I have strived to understand the context through own experiences, literature and qualitative interviews.

The result, this thesis should be used by persons of non-Moldovan nationality, entering the Moldovan system or market within the field of renewable energy, in order to increase their understanding of the subject and its context in Moldova. It could also be of practical interest for the Moldovan community, especially for the population of Lozova, when implementing RE.

### METHOD

To reach a profound understanding about the subject of renewable energy in Moldova I had to approach the subject from several perspectives. I approached it from the technical perspective and the social perspective. I read literature and discovered the viewpoints of as many groups of interest as possible.

I have been breaking new ground with my thesis. There is a lot of knowledge about the technical feasibility of renewable energy in Moldova by Moldovans but the landscape planning approach collecting bits and pieces to create an overall picture of the technical complexity, in comparison with Sweden is new. I have therefore been searching for a method rather than following any specific method.

I started out in Sweden. Any study like this needs a vast amount of knowledge. To be able to ask questions and to get answers I needed to know a lot about Moldova and about renewable energy. This was my first task. I started from scratch, only knowing that Moldova was a former part of the Soviet Union and roughly where it was situated. This is the knowledge most people have of this country in Sw



den. I started out with a broad overall covering method getting the most easily accessible basic information about Moldova. I moved on to reading about land reforms, history, statistics, culture and projects. I searched the internet for updated information, social forums, independent media, trying to find the platform of my study, where I could take on the research. I searched in order to get a picture of the current situation about RE, their amount of knowledge and their efforts to expand the field. I read the Swedish cooperation strategies for Moldova in foreign relations, the Moldovan energy profile and about different social issues important for Moldova.

Parallel to this I learned about renewable energy in general. I studied all different sources to have basic knowledge about the possibilities within the field. My background in engineering studies was useful. I interviewed Henrik Gustavsson at Biogas Syd and Anna Cornander at Solcity Malmö in Sweden. I also met the people involved in renewable energy. I met representatives engaged in bio energy, sun energy and wind energy. Before moving to Moldova I started up a network of contacts in order to facilitate the forthcoming meetings with people involved in the subject.

In Moldova I met up with 8 \ companies, RE project managers, academics, officials and other people of the Moldovan population. I met Swedes in Moldova involved in the country in different ways, Sida a correspondent now being the new ambassador of Sweden in Moldova, an EU representative, company representatives, UN employees, volunteers etc.

Solely living and working in Moldova gave me a lot of experience of the Moldovan mentality, culture, and society. I visited different parts of the country, Transnistria, Gagauzia, northern, southern, eastern and western parts. In the different locations I met



FIGURE 5: ANATOL ISBU, MAYOR OF ANTOESTI AND ME  
PHOTO BY ANNELIE KJELLBERG

people, ordinary people and officials like mayors and project managers. After a consultation with a networking agency (YEC Star) in Moldova I decided to focus my rural interviews in Lozova. I selected Lozova because it is close to Chisinau which facilitates transportation but far enough away from Chisinau to be a village character. To be close to Chisinau the village would rather be a suburban area. Most important was that I got a helpful contact person in Lozova that could help me book meetings with a diverse group of villagers. 10 interviews with locals, one being the mayor were conducted.

To understand the landscape and the natural history of the area and Moldova as a whole I visited the nature reserve Codrii outside of Lozova. A forester showed me around describing the natural and unnatural biotopes of Moldova and the specifics of the region.

The people I have met have been a mix between who I could find and who actively



FIGURE 6: RODICA JARDAN, TEACHER IN LOZOVA. PHOTO BY ANNELIE KJELLBERG.

searched for. Some were found through contacts found on internet and some through my contact network. I wanted diversity and to meet all interest groups to understand the complex subject from all directions. This makes me more objective in my analysis. I asked an American Peace Corp and a teacher involved in the community to find the 10 people I interviewed in Lozova. I asked for diversity in age, profession, gender, interest in the subject and level of education. The outcome was a slight overrepresentation of well educated women due to their networks of contacts and who they were comfortable in asking to participate. To prepare my interviews I read the book

7 tekniker och eg  
 11. The original title  
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I composed a document with the fields I wanted to cover in the interviews. I developed possible questions within the fields that would be effective. I discovered more and more that I needed to position myself for this

document since there was a great range in their knowledge and how I needed to meet different people. I changed my questions according to the situation and person but covered all fields in one way or another. I asked attendant questions and continued asking until the field was exhausted. After 10 interviews I felt that one more would not add substantial information.

I recorded the interviews on a Dictaphone in most cases. I asked them if it was ok as part of creating a trustful atmosphere. Some were comfortable with it and then I had to take notes instead. I transcribed them as soon as possible to minimize the distortion of my memory. Confidence and trust is important in an interview and social chatting important for the person to feel comfortable. I used a translator in all local interviews except one when I interviewed an English teacher. In the inte-

a translator in many cases as their English was good. I transcribed all meetings afterwards.

Back in Sweden I have analyzed the interviews v-

Ryen<sup>12</sup>. Matt McCaffrey, the American Peace



FIGURE 78: SERGIO ONGRIANA, MY TRANSLATOR, AND MATTHEW MCCAFFREY, AMERICAN PEACE CORP. PHOTOS BY ANNELIE KJELLBERG

Corp, was present at all interviews in Lozova and Sergio Ongriana, my translator in most interviews. Through conversations with them I

<sup>11</sup> Gillham, 2008

<sup>12</sup> Ryen, 2004

have been able to analyze these interviews even better.

I have compiled the information, analyzed it and its context and compared. Afterwards I have discussed the possibilities and how to handle the subject of renewable energy implementation in Moldova. For the discussion I have read about different aspects to get quality in the text. Finally I have reflected on my method and experiences.



FIGURE 9: ME PRESENTING MY STUDY AT A WATER AND WASTEWATER EVENT THAT I ORGANIZED TOGETHER WITH A CANAL CHISINAU AS EMPLOYED BY BORLÄNGENERGI IN MARCH 2010 IN CHISINAU PHOTO BY DANIEGRAAN

Since January I have also had an employment at Borlänge Energy coordinating their projects in Moldova. This has taken me back to Chisinau two times this spring. I have through my experienced the professional culture managing the projects together with Moldovans adding to the experience gained in previous meetings. During these visits I also met with officials and others to collect supplementary information for the thesis.

## FOCUS

I have in this thesis explored the complexity of renewable energy implementation in the Republic of Moldova (RM). It has been a study to explore what subjects and aspects within the sociotechnical complexity that are of interest

for the implementation of RE in the specific context of RM. Therefore I have covered a wide range of subjects. All are however possible to categorize within the scope of society development and planning. I have reached for more breadth than depth and the subjects are all touched to the level I found appropriate for study.

I have not described the different types of renewable energy sources and technologies. This knowledge is better to gain in a book specialized in describing them. There are many of these books and this is not a thesis in engineering. The technologies are also constantly developing. I found it however important to include a definition of renewable energies as part of the theory behind the thesis to make it clear. There are many different definitions so it is important to specify the one I have used.

I have aimed to describe the cultural context in Moldova, the problems facing Moldova right now and the transition that both society and landscape are currently in the middle of. I have also discussed the possibilities and how the situation can be handled.

This study supplements studies performed earlier in RM with its holistic, technical planning approach.

Earlier studies on the possibilities of RE in the Republic of Moldova have in general been made by engineers and focused on technical aspects.

This study is also made by me as a Swedish landscape planning student with background in the Swedish cultural context. This makes this study appropriate to read by Swedish persons who wish to understand the context of Moldova. The common perspective of writer and reader facilitates the understanding of the text. For Swedish people entering the Moldovan market within this field this study can therefore be a good help to understand this country with potential to explode in opportunities at any



moment, especially if the possibility of membership in the EU would be announced.

## STRUCTURE OF THE THESIS

Abstracts in English and Swedish are followed by table of contents and list of abbreviations used. The preface describes the background of the study, the situation in Moldova briefly and why the study is needed. It also includes aim, objectives, method and focus of study.

In the theoretical chapter I have referred to the definition of RE that I am using in the study. Earlier studies in cultural dimensions in management and planning as well as decentralization and democracy are referred to.

The chapter about the present situation aims to describe the situation straight forward, choosing the subjects I found important to the study. The problems and issues in Moldova that need to be addressed are then further explained. After this follows a discussion on the possibilities in Moldova and how the issues and implementation can be handled. The example of Lozova is given to concretize the discussion. The final conclusions condensate the discussion in a few sentences about the most important results.

The chapter with reflections includes different personal reflections from working in Moldova and reflections on my method.

My references are written to facilitate reading. Therefore I have used two types of references where (name, year) is used when giving a reference of a published text and with a footnote when referring to different facts or information gained from the specific source. The method (name, year) is also used where it was not possible to insert a footnote.





## THEORY

### DEFINITION OF RENEWABLE ENERGY

The definitions to be found are statutory and not scientific. They are derived from practical work and meant for legislative purposes. Most descriptions are defining RE by giving examples of what is included.

The one I found most useful was from the International Energy Agency, The IEA is not legislative body but influential. Their definition is as follows:

Renewable energy processes that are replenished constantly. In its various forms, it derives directly or indirectly from the sun, or from earth generated deep within the earth. Included in the definition is energy generated from solar, wind, biomass, geothermal, hydro power and ocean resources and bio fuels and hydrogen derived from

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### THE CULTURAL DIMENSIONS OF MANAGEMENT AND PLANNING

This paper deals with different aspects of the implementation of RE in Moldova. It focuses on understanding the Moldovan society and from that draw conclusions on the needs for RE and how it could be implemented. Understanding the Moldovan society is understanding the Moldovan culture. Management and planning are socio-technical activities dealing with both

FIGURE 10 (OPPOSITE PAGE): BOOKS. PHOTO BY ANNIE KJELLBERG

people and non-human resources. Sometimes it is more technically oriented and sometimes more socially oriented, but never is one of the two components absent. Therefore management and planning will always be affected by culture. This aspect is important to take into account when working internationally. A management technique or philosophy that is appropriate in one culture can be inappropriate in another.

Geert Hofstede has written the scientific paper # = s- discusses research performed in more than 50 countries around the world about these differences in the field of Planning. He defines culture as a collective programming of people's minds which distinguishes the people of one group or society from those of another. Individuals are of course different but culture that he refers to is a component shared by these otherwise different individuals and absent in other societies.

Four underlying value dimensions were found. These are fundamental issues in human societies that all societies need to find their specific answers to.

#### 1. COLLECTIVISM/INDIVIDUALISM

In an individualistic society everyone is expected to take care of themselves and their immediate family. People are motivated by self interest. In a collectivistic culture everyone is cared for by the group, clan or relatives in exchange for unquestioning loyalty. They are motivated by the interests of their group. The terms of collectivism or individualism is not used here to describe a political system. There is a correlation with economic development. Countries with a more developed economy are more often individualistic and less developed ones are often collectivistic.

This dimension relates to people's self concept

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<sup>13</sup> IEA 2009:16

ample business relationships conflict resolution.

## 2. LARGE/SMALL POWER DISTANCE

The power distance is also an aspect that tends to separate countries of different economic development. More developed economies often have a small power distance and vice versa. It describes to what extent people accept that power is distributed unequally. It affects the way institutions and organizations are built. In a society with a large power distance, you find strong hierarchies where everyone has a place that needs no further justification. In a society with a small power distance there is a strive for power equalization. Any power inequalities need justification.

This dimension shows for example in how independent the subordinates are, the need for subordinate consultation or paternalistic management, and how status is achieved.

## 3. STRONG/WEAK UNCERTAINTY AVOIDANCE

This aspect describes the degree of how uncomfortable the people are with uncertainties or ambiguities. Cultures with strong uncertainty avoidance protect conformity, have rigid codes of behavior and are intolerant to deviant people or ideas. Law and order are important. In a weak uncertainty avoiding culture, practice counts more than principle and the atmosphere is more relaxed.

As with power distance, this dimension has consequences on how societies build their institutions and organizations. It affects formalization, emotional expression, and how time and future is handled.

## 4. MASCULINITY/FEMININITY

This dimension refers to socially developed gender, in opposition to the biological sexes. A masculine society appraises achievement, assertiveness and material success. It is a performance society where males and females

normally have specific types of professions. A feminine society is directed towards relationships. Modesty, care for the weak and an orientation towards quality of life are characteristics. These are often welfare societies.

This dimension as the first one relates to people's orientation towards masculinity or femininity. Feminine cultures are more economically effective than the other. What counts is if the management is carried out according to the value system of its people.

## DECENTRALIZATION AND DEMOCRACY

The focus on society and a development of society in relation to the implementation of RE decentralization raises the questions of decentralization and democracy. An implementation of renewable energies could be connected to further decentralization in Moldova. It is often assumed that decentralization implies democratization. A study in Central and Eastern Europe: a skeptical view on this is not necessarily true.

Decentralization is a multidimensional concept. The factors of function, control and financing can be positioned differently within the system of government. The range of functions carried out on local level can vary. The local control of these functions can also be very different and how the local government is financed has considerable consequences on the amount of influence of the public.

Democracy is a term more easily used than defined. There are a wide range of government systems that are labeled democratic. It can be direct participation in decision making or simply having one's interests met. The paper describes democracy as having eight features, taken from



1971, page 3): freedom to form and join associations, freedom of expression, right to vote, eligibility for public office, right of political leaders to compete for support, alternative sources of information, free and fair elections, institutions for making government policies depend on votes and other expressions of preference.<sup>15</sup>

Even if there is decentralization, the level of democracy depends on the operational and central governments. It depends on the power, behind the facade of democracy, is exercised by officials and elites or if the system is responsive to the public pressure through political representatives.<sup>16</sup>

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<sup>15</sup>Pickvance, 1997, p. 131

<sup>16</sup>Pickvance, 1997, p. 133





## PRESENT SITUATION IN MOLDOVA

### GEOGRAPHY AND DEMOGRAPHY

Moldova is a small country situated in eastern Europe between Romania and Ukraine. It is close to the black sea but without a shoreline.

The population is about 3.6 million but that is including all the people that work abroad and still have citizenship in Moldova. The people I interviewed estimated these people to about one million. Residences are concentrated in villages, 4 smaller cities and Chisinau, the capital. The population of an average settlement is 1.4 thousand. Chisinau has a population of nearly 800 thousand and Lozova, where I conducted most of my interviews with rural population, is located close to Chisinau in the region of Straseni. It has around 7000 inhabitants. The village is built on five hills and is a rather big village.

There are two areas with different levels of autonomy. The region east of the Nistru river is called Transnistria. It is a long and thin area all

along the east border of Moldova. The second area is called Gagauzia and is situated in the south of the country.

A big part of the population speaks both Romanian and Russian from childhood. Only in some villages they speak only one language, often Romanian. Moldovan is basically Rumanian with some words borrowed from Russian. In Gagauzia they speak Gagauzian and Russian. The people of Transnistria speak Russian.

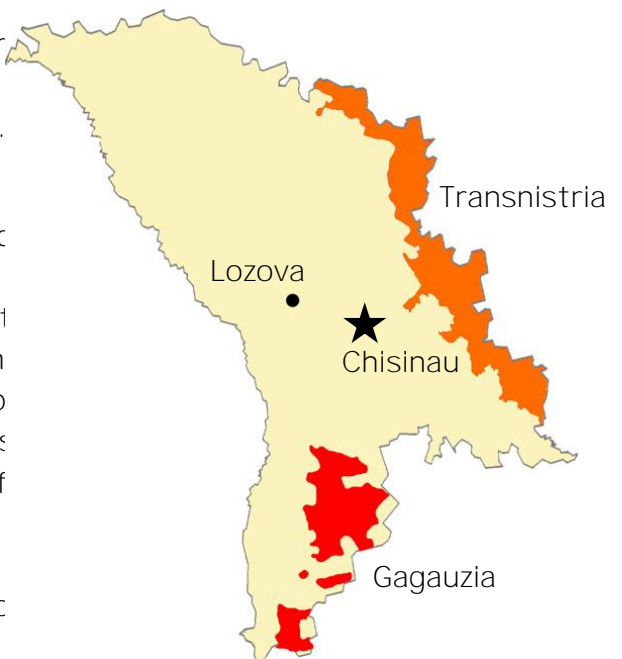


FIGURE 13 MAP OF MOLDOVA. FIGURE BY ANNELIE KJELLBERG

The topography of Moldova is a hilly plain sloping from northwest to southeast. The highest point is 430 meters above sea level and the



FIGURE 12: LANDSCAPE NEAR LOZOVA. AVAILABLE AT [HTTP://COMMONS.WIKIMEDIA.ORG](http://commons.wikimedia.org) 20100426

FIGURE 11 (OPPOSITE PAGE): MOLDOVA IN EUROPE. AVAILABLE FOR AT [HTTP://COMMONS.WIKIMEDIA.ORG](http://commons.wikimedia.org) 20100426

<sup>17</sup> Statistica Moldovai, 2008

<sup>18</sup> Climate change office, 2008

hydropower are limited. There are two biggertinental regions in the north and the Med rivers. Nistru is between the self claimed autteranean air from the south west. The climate nomous region of Transnistria, called the lefts characterized by relatively milder winters along bank, and the rest of Moldova, called the right and warm summers, and low humidity. The bank. Prut, the second river, makes up the border to Romania.

The country has a moderately continental climate. The air masses from the Atlantic in the west mix with the air from the extreme con

duration of sun brightness is 2,300 h/year<sup>20</sup>. A considerable amount of the sun hours is between April and September with 1,500 1,650 h. There is not a lot of wind but enough to put up wind power in some areas.

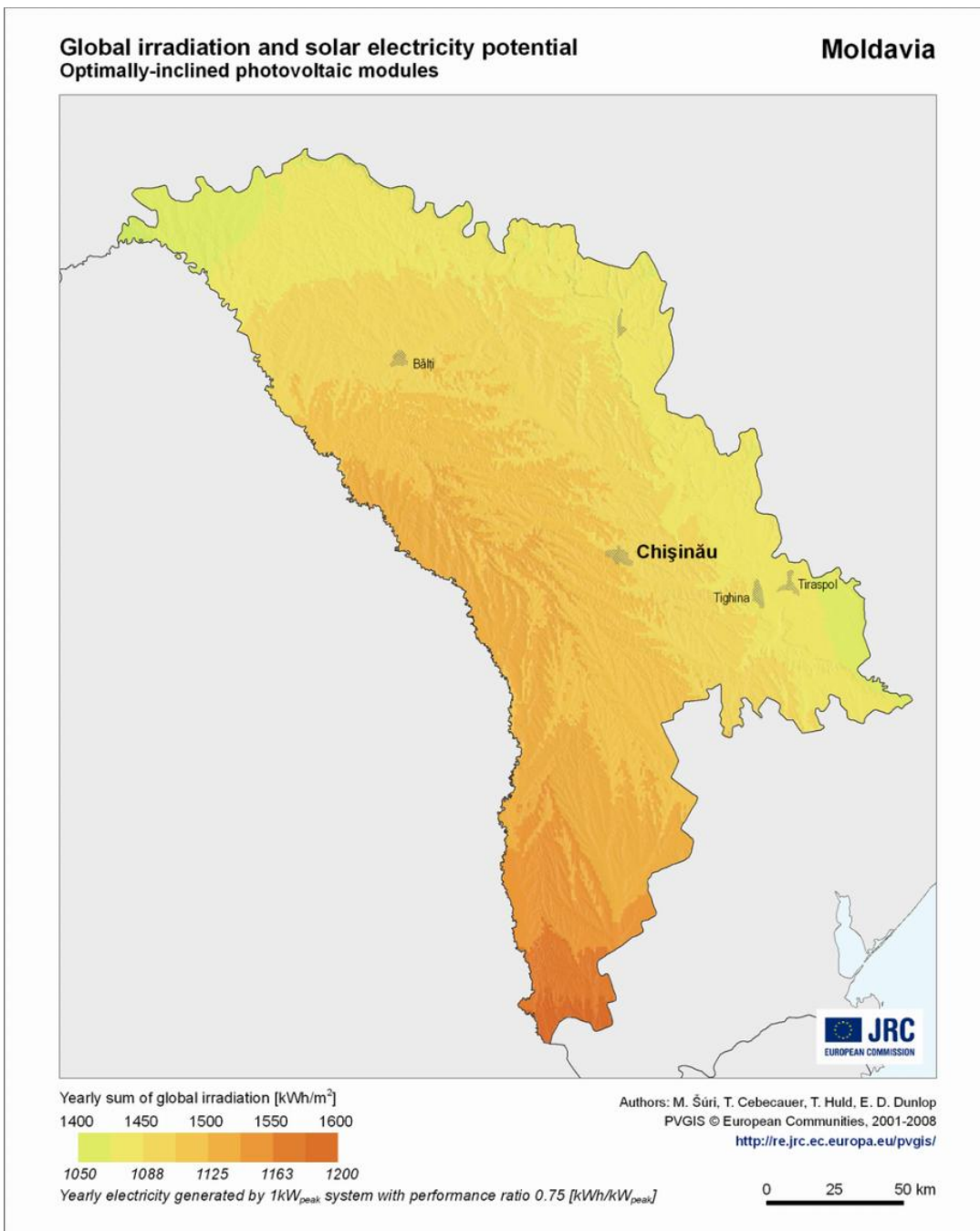


FIGURE 14: AVAILABILITY [HTTP://RE.JRC.EC.EUROPA.EU](http://re.jrc.ec.europa.eu)  
20091029

<sup>19</sup>Climate Change Office 2008

<sup>20</sup>Min of environment, UNDP 2002



The flora of Moldova is rich with 5.5 thousand species. Its diversity is strongly influenced by the geographical position and the characteristics of the topography and climate. The natural zones inside Moldovan borders are forest steppe and steppe. The biotopes in the region around the nature reserve Codrii, close to Lozova in the central part of Moldova, include beech forest, sessile oak forest with ash tree and linden tree, and the pedunculate oak forest with hornbeam.<sup>22</sup> The fauna of Moldova is also very diverse with 15.5 thousand species. Different types of deer, wild boar and wild European cat are examples.



FIGURE 1520: PHOTOS FROM CODRII RESERVE BY ISMA VALERIU

<sup>21</sup> Republic of Moldova 200904

<sup>22</sup> Moldsilva, 2006

<sup>23</sup> Republic of Moldova 200904

PHYSICAL STRUCTURES

LAND USE

The rolling landscape of Moldova is mainly cultivated (58.5% Agriculture, due to the fertile soil and the favorable climate, is the main source in Moldova. The industry is mostly based on processing raw materials from agriculture. 45% of the active labor force is involved in the agricultural production. During the Soviet time land was divided into big farms of Kolkhoz and Sovkhoz. One village today was one for example Kolkhoz during that time. Kolkhoz was run by a collective while the Sovkhoz was run by the state. In practice there was hardly any difference. An Interfarm was an operation between farms. The export was wine and tobacco and is still to this time.

reform. The land reform was a part of it. In 1996 the pilot project started. The actual program called the National Land Program, NLP, was launched by the government in 1998. The land was equally divided between the members of the collective farm without any reference to land ownership before Soviet time. When land was taken over by the children it is divided which results in thin strips of fields, similar to what we had in Sweden before the consolidation (big skifte). The plots are managed individually. Because of the large emigration of Moldovans, many fields are not in use. Cadaster is in charge of registering the land ownership after privatization. It is hard to determine the ownership of many of the fields. It takes time and resources.<sup>26</sup>

The objectives were several. It was an economic reform to reorganize the economy, juridical systems, and management systems. They wanted to satisfy the provisions of agricultural quality products, create a socioeconomic liberty for farm workers, stimulate the export of agricultural products, improve the living standards of peasants with better working conditions and social protection and lastly ameliorate the ecological situation.<sup>27</sup>

What happened was that the agricultural land was divided into 3 million plots through a distribution based on equity. The market distribution network broke down together with the zoo technical system. The soil is deteriorating, plots are left due to migration and the economic gap between urban and rural areas is increasing.<sup>28</sup>



FIGURE 21: POSTER AT THE MUSEUM OF THE NATIONAL HISTORY OF MOLDOVA PICTURING A KOLKHOZ PHOTO BY ANNELIE KJELLBERG

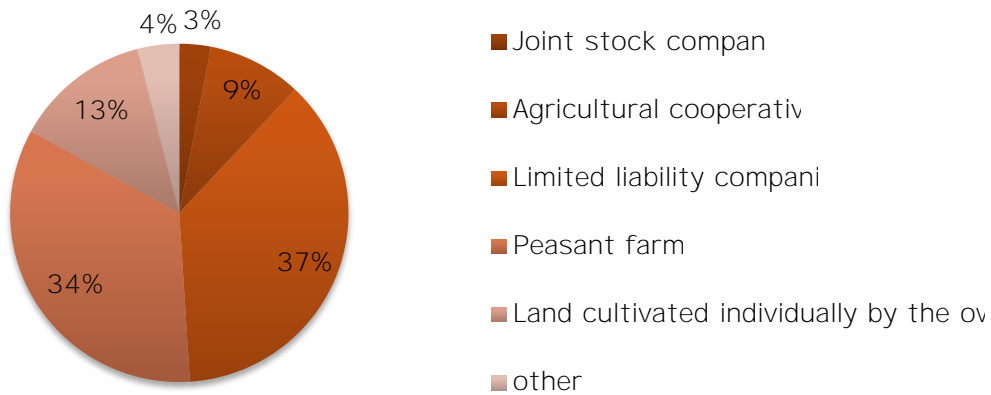
The privatization of land took place during the years 1996 and 2003. The Parliament decided in 1991 to carry out the agrarian

<sup>24</sup>Climate Change Office 2008  
<sup>25</sup>Cernea, 2008

<sup>26</sup>Cernea, 2008  
<sup>27</sup>Cernea, 2008  
<sup>28</sup>Cernea, 2008



THE STRUCTURE OF AGRICULTURAL LAND USE BY CATEGORIES OF OWNERS IN JANUARY 2008 (CERNEA, 2008)



There are large amounts of agricultural waste consisting of mainly straw but also sun stalks, twigs from grapes and fruit trees and residues from corn. Of the straw they use what they need for their animals and build rest, which is the main part, in the fields



FIGURE 22: FACTORY PRODUCING ANIMAL FEED IN CAHL CLOSED DOWN DURING THE ECONOMIC CRISIS PHOTO BY ANNELIE KJELLBERG



FIGURE 23: SATELLITE IMAGE OF MOLDOVA. AVAILABLE AT [HTTP://COMMONS.WIKIMEDIA.ORG](http://commons.wikimedia.org) 2010-04-26. EDITED BY ANNE KJELLBERG.

There is very little industry left after the economic crisis that followed the privatization

The forest cover is 11% and more concentrated in the central parts of the country. There are four nature reserves in Moldova; Codrii near the village of Lozova is one of them. It covers 5,176 ha. Total area for forest reserves is 18,226 ha

The academy of science is now working with a project of afforestation

<sup>29</sup>REAW, meeting 2009-06  
<sup>30</sup>Caisin meeting 2009-08

<sup>31</sup>Statistica Moldovai, 2008  
<sup>32</sup>ASM meeting 2009-05

## VILLAGE STRUCTURE

Villages are mostly made up of simple houses. Apartments are to be found in the cities or towns.

There are hardly any gardens with the only intent to be decorative as is common in Sweden. All space around the houses is covered by crops or husbandry. The pathways are ceilinged with grapes that can produce around 400 liters of wine for one family. Almost every household produce their own wine. Wine has become a very important part of the Moldovan culture manifested in festivals and obligations of wine at visits to the rural areas. The main part of the population also has a piece of land outside the village where they rotate different crops. Many people in the cities have a small field outside the city



FIGURE 24: COMMON GARDEN IN MOLDOVA. PHOTO TAKEN IN CAHUL BY ANNELIE KJELLBERG.

Before the economic crash following the privatization, animals were kept in large farms outside of the village. Now the animals are kept in their private gardens. A plot in the old part of Lozova is about 60 m<sup>2</sup> including the house.<sup>34</sup>



FIGURE 25: HOME MADE WINE (SUPERB). PHOTO TAKEN IN LOZOVA BY ANNELIE KJELLBERG



FIGURE 26: BIRDS KEPT IN GARDEN. PHOTO BY ANNELIE KJELLBERG

<sup>33</sup>Lozova, interviews 2002-2009 2-17

<sup>34</sup>Lozova, interviews 2002-2009 2-17



## INFRASTRUCTURE

The infra system standard is low.

In the rural areas there is hardly any system for waste and especially no recycling. Litter can be found everywhere and in large deposits with out gas retrieval, with some exceptions, one

waste in the south part of Chisinau but it failed. One man tried to recycle plastic bottles for export but it was hard to get villages to sell their waste<sup>35</sup>

Roads are of poor quality. There was recently a successful road project in Lozova where they collected money from the village people to finance it. Many smaller streets are made of dirt. Horse pulled wagons are not an unusual part of transportation in the village.



FIGURE 27: HORSE PULLED WAGON IN LOZOVA. PHOTO TAKE BY ANNELIE KJELLBERG

One of few existing sewage systems is the one in Chisinau. The waste water from the water toilets in the villages goes directly out in small channels or a pit that is cleaned sometimes.

Otherwise it is common in the villages to have outdoor toilets with a hole in the ground that in most cases are emptied once in a while.

Most houses in the villages have their own shallow well. Water is divided in potable water and technical water. Due to the keeping of animal husbandry around the wells and sanitation concerning the outdoor toilets many of the wells are polluted. It can be distilled but that

requires expensive energy. In Lozova only about one out of 10 wells has good water. Around 85% of the rivers are more or less contaminated.<sup>37</sup>

## ENERGY USE

### ENERGY USE IN VILLAGE

There are few places with street lamps outside of Chisinau. In Lozova there was a project installing ordinary lamps on high poles. People paid 8 or 9 leis per month. The lamps broke down quickly, no one replaced them, and it left an unsatisfied population without lighting.<sup>38</sup>

The period of year that the buildings need heating in Moldova is 6 to 8 months. The schools, kindergartens and primarias (mayor's office) often have an old ineffective coal fueled heat installation. The primaria in Lozova is without heating. It is also cold in the school in Lozova. The coal burner is placed far from the school and the conductors are b

<sup>37</sup>Hugosson, Larnholt, 2010

<sup>38</sup>Lozova, interviews 2009-26 2009-2-17

<sup>39</sup>The World Bank, 2008

<sup>40</sup>Lozova, interviews 2009-26 2009-2-17

<sup>41</sup>Lozova, interviews 2009-26 2009-2-17

<sup>35</sup>SalvaEco, EcoExpert, meeting 2009

<sup>36</sup>Lozova, interviews 2009-26 2009-2-17



DOMESTIC USE OF ENERGY

Soba is the traditional and still widely used way to heat the white house. It is a ceramic oven with a long smoke channel making up part of a wall in the house. Many houses have up to three sobas. It heats the rooms on both sides of the wall and is also used for cooking. The soba is important for the Moldovan people as it constitutes a guaranty for the people to be able to heat their houses. They also like them esthetically. Traditional food is cooked using the soba. It is fired with mainly wood. Wood is used to

start the fire and coalwood to keep it. Twigs from vines, parts of corn and stalks from sunflower are also used.<sup>42</sup>

Wood is a common fuel for heating. It is bought or brought from the forest. In Lozova they can buy it from the municipality. They divide it into amounts of 10<sup>3</sup>/family. 10<sup>3</sup> or little less is used per year. This wood often comes from villages 7-80km away. It cost 4000 lei /truck (~3000 SEK) which correspond to around 10 400-5000 lei (~3000 SEK) according to one person I interviewed.<sup>43</sup>



FIGURE 28: VICTORIA MOCANU, MILA AND ONE OF HER SOBAS IN LOZOVA. PHOTO TAKEN BY ANNELIE KJELLBERG.



FIGURE 30: WOOD A COMMON FUEL PHOTO TAKEN IN LOZOVA BY ANNELIE KJELLBERG



FIGURE 29: SOBA. PHOTO TAKEN IN LOZOVA BY ANNELIE KJELLBERG

Coal comes in different qualities and has a higher heat value than wood. They get some of it from the region, Straseni, where Lozova is situated. It is more expensive than wood, around 4000 lei/ton (~3000<sup>44</sup>SEK).

Gas is also commonly used. There is a big gasification project going on in Moldova aiming to provide 100% access to the gas net for all consumers. Gas is used both for cooking and heating. Many people have combined systems with gas heating together with other forms of heating. They can for example install it in the soba<sup>45</sup>

<sup>42</sup>Lozova, interviews 2009-26 2009-2-17

<sup>43</sup>Lozova, interviews 2009-26 2009-2-17

<sup>44</sup>Lozova, interviews 2009-26 2009-2-17

<sup>45</sup>Lozova, interviews 2009-26 2009-2-17

Gas costs maybe twice as much as wood, 7000 lei (MDL) (~5000 SEK)/year, but in some parts of the country where they have dering the amount of work associated with more cows and less wood<sup>47</sup> wood, many think it is worth it it is considered clean and comfortable.<sup>48</sup>



FIGURE 31: COMBINATION SYSTEM. PHOTO TAKEN BY ANNELIE KJELLBERG

In Lozova there are several factories producing wooden boxes for fruit. The villagers can get the residue sawdust cheap, 1,050 lei (MDL) (~355 SEK) /truck and. Creative citizens have built different systems using this for heating. One is a cone you put on top of the soba that releases some sawdust at the time and the heat lasts the whole day. Some have built a system of oil barrels and pipes that they fill time a day and it burns for 10 hours. A big advantage of this is that it is still warm in the morning which increases the comfort. The work connected with this takes 20 minutes each day. Electricity is used for lighting and other apparatus. Some also use it for heating in combined

Most systems for energy today are old. They have a very low efficiency. The energy efficiency of a soba is around 12%. Many of the systems are from the soviet time. The old houses in Moldova were built of clay. The clay conserved the heat much better than the concrete used today. There is no extra insulation in the houses.<sup>48</sup>

In Lozova around 80% of village is connected to the gas network and around 60% uses gas for heating. Around one third of the villagers used wood for heating and coal when it is colder. Energy is also used for distilling water in Lozova.<sup>49</sup>

## RENEWABLE ENERGY IN MOLDOVA

### RENEWABLE ENERGY TODAY

This chapter and the following are an attempt to give a general idea of the presence of renewable energy and RE projects at present in Moldova. The compilation is based on information I have received through different interviews and the Internet. It is by no means a complete list of existing RE and RE projects at hand, although I have tried to get as much information as possible.

An example of a successful project on a-renewable energy was implemented in the village of U... from Agricultural Was... between 2005 and 2008. They installed 11 biomass boilers in 8 villages heating schools and kindergartens, 7 big ones at 300 kW or 600 kW and 4 small boilers at up to 90 kW. The biomass boilers burn straw that is stored in an accumulation basin. It is a central heating system. The first phase was to put up the demonstration units. The second phase was to

<sup>46</sup>Lozova, interviews 20026 2009 2-17

<sup>47</sup>Lozova, interviews 20026 2009 2-17

<sup>48</sup>Lozova, interviews 20026 2009 2-17

<sup>49</sup>Lozova, interviews 20026 2009 2-17



FIGURE 32: HYDRO POWER PLANT IN DUBASARI, TRANSNISTRIA. PHOTO TAKEN BY ANNELIE KJELLBERG

establish a supply chain of biomass with a bale market. The third phase funded public inspired by the biomass boilers installed by awareness campaigns to reduce the information barrier for using RES.

11 more boilers have been installed by the people themselves after the project closure. That is a very positive outcome. The potential for scaling up is estimated to be substantial although the private sector will likely depend on external funding for the start up costs.

One man in Antonesti built his own installation inspired by the biomass boilers installed by awareness campaigns to reduce the information barrier for using RES.

Bio-fuel is produced in Moldova but exported to Germany where it is upgraded and used.

There is a station for biogas capture at the landfill in Tintareni village in the Anenii Noi district. It was commissioned officially and started operating the 25<sup>th</sup> of September in year 2008. The project beneficiary is the Moldovan



FIGURE 33: BIOMASS BURN FROM THE REAW PROJECT PHOTO TAKEN IN ANTONESTI BY ANNELIE KJELLBERG

Many households, somewhere between 50% and almost everyone in Lozova are using sun energy in the so called summer showers. It is common all over Moldova. A dark painted tank of water absorbs heat from the sun. It is mounted on top of an outdoor shower cabin. Some houses in Chisinau also have sun panels on the roof.

There are 3 hydro power plants in use in the Nistru River. Two of them are controlled by Transnistria and the energy stays within their border. Small hydro power plants were used in the soviet time. They still exist but need replaced turbines.

<sup>50</sup>CAPMU, 2008  
<sup>51</sup>REAW, meeting 200906

<sup>52</sup>Climate Change Office, meeting 20091216  
<sup>53</sup>Taranu, email 200916  
<sup>54</sup>Lozova, interviews 200926 20091217  
<sup>55</sup>Lozova, interviews 200926 20091217



Geothermal energy is rarely used but has been installed in some places during the last year earlier. 13 of January 2010 it was not yet a proved.<sup>60</sup>

According to the definition, the widely used wood (and sawdust) is also a renewable energy source. A waste incineration plant is planned in Chisinau municipality. It will have a capacity of around 600-650 tonnes per year. The investment promised for building the plant is around 190 million euro. Chisinau is negotiating with their houses from Italy about the project.<sup>61</sup>

The Climate Change Office was created by the Ministry of Environment. They implement projects concerning climate change and reduction of green house gases. In some cases it is connected to renewable energy. It is both commercial and non-commercial projects. There is a project on bio energy, a cooperation between the University of Agriculture in Chisinau and Czech Republic, creating a demonstration site. The objective is to show how agricultural waste can be used to create energy.<sup>62</sup>

During my meeting with the vice director of the department of Architecture at Chisinau City Hall he told me that a new general spatial plan of the municipality of Chisinau was recently approved. Renewable Energy was not taken into consideration.<sup>63</sup>

Wind energy is also being planned in 5 different regions from the north to south, in total 100 MW.<sup>64</sup>

The Academy of Sciences of Moldova is currently working on an installation to demonstrate different kinds of renewable energy sources. They are installing wind turbines, thermal sun panels and PVs. The objective is to test the technology and to demonstrate it to the public, increasing awareness and acceptance.<sup>64</sup>

## ONGOING PROJECTS

Prototype Carbon Fund (PCF). It started in the second half of year 2005. It concerns the implementation of 2500 small projects focused on the improved energy efficiency in public buildings. The main activity is the switch from fossil fuel to biomass burning. The projects are scheduled for 10 years and the beneficiaries are the local authorities.<sup>65</sup>

The Carbon Finance Unit, within the Ministry of Environment, is working on planning two projects on biogas. One project is a CDM project aiming to produce biogas from animal manure. They have selected 18 of the biggest poultry and pig farms to work with. The other project aims to create an enabling legislative and policy environment. It is also about awareness and capacity building.<sup>65</sup>

project to the Designated National Authority (DNA) for approval early in year 2009. It concerns the station for biogas capture mentioned

<sup>56</sup> Ongriana, 2009-26

<sup>57</sup> Min. of Environment, UNDP, 2002

<sup>58</sup> Blaj, meeting 2003-26

<sup>59</sup> Taranu, email 2010-16

<sup>60</sup> Taranu, email 2010-16

<sup>61</sup> Taranu, email 2010-16

<sup>62</sup> Climate Change Office, meeting 2009-11-06 Taranu, email 2010-1-16

<sup>63</sup> Climate Change Office, meeting 2009-11-06

<sup>64</sup> ASM, meeting 2009-05

<sup>65</sup> Gavrilita email 2010-205

## POLITICS AND GOVERNANCE

### ORGANIZATION

Moldova has the national, regional and municipal level of formal decisions. The country is divided into 32 districts or regions, 5 municipalities and 2 administrative territorial units (Transnistria or Pridnestrovia and Gagauzia). Bureaucracy is still strong with a clear hierarchy. A young person with initiatives may feel inhibited to act on them to violate the hierarchy.



FIGURE 34: THE PRIMA IN LOZOVA. PHOTO BY ANNELIE KJELLBERG

In earlier years there were more NGO's but with the recent economic crisis a lot of funding was cut and many organizations stopped their activities.<sup>67</sup>

### POLITICAL INSTABILITY

Since the parliamentary elections in April, Moldova has been without a president. In the last presidential election no candidate got enough votes and the problem will probably not be resolved until the next election. The situation with Transnistria and their wish to have their autonomy recognized is also adding to the political instability. This is creating a non enabling environment for investments.



FIGURE 35: THE PARLIAMENT IN MOLDOVA. PHOTO BY ANNELIE KJELLBERG

### CORRUPTION

The corruption is also a barrier to make investments. Transparency International reports an index of 2.9 where 1 is total corruption and 10 is no corruption. This puts Moldova as number 109 out of 180 countries in the list where number one is least corrupt. Sweden has an index of 9.3.<sup>68</sup>

### LEGISLATION

The Law on Renewables was accepted by the parliament in July 2007. It includes that the energy distributors are obliged to buy RE at a price that returns the investment in 10 years. It uses a feed tariff.<sup>69</sup> The law is accepted but does not yet work satisfactory in practice.

According to the Energy Strategy of Moldova to the year 2020, approved in August 2007, there was at that time no primary legislation in force in the field of RES. It also confirms the goal of 6% RES in 2010 and 20% RES in 2020 in the national energy balance.<sup>70</sup>

Other important policy documents are the Methodology for the Determination, Approval and Application of Tariffs for the Electricity Generated from Renewable Electric Energy and Biofuel ANRE Resolution No. 321 from 22.01.2009, and ANRE Resolution No. 033 from 03.04.2009 on approving the Regulation on the Guarantees for Origin of Electricity Generated from Renewable Electric Energy and Biofuel.<sup>71</sup>

<sup>66</sup>Climate Change Office 2008

<sup>67</sup>Ecosfera, REC Moldova, meeting 2009

<sup>68</sup>Transparency international, 2002

<sup>69</sup>Climate Change Office, meeting 2009

<sup>70</sup>Min. of Industry and Infrastructure, 2007

<sup>71</sup>Climate Change Office 2008



FIGURE 36: ADMINISTRATIVE MAP. AVAILABLAT [HTTP://COMMONS.WIKIMEDIA.ORG](http://commons.wikimedia.org) 2010@426.

Regarding bio gas production there is a regulation on a sanitary zone. How this would work with smaller installations is unclear.<sup>72</sup>

Moldova also passed the law on environmental impact assessment.<sup>73</sup>

National Agency for Energy Regulation (NRE) is the institution that issues licenses, regulates prices and establishes principles and methodologies.<sup>74</sup>

## MENTALITY AND ACCEPTANCE

I will in this chapter try to give you a picture of the Moldovan mentality and their acceptance to renewable energy solutions.

## MENTALITY HERITAGE

The Moldovan mentality is performed by their recent history being part of the Soviet Union. But all former parts of the Soviet Union are very different from each other. And of course even in Moldova there are differences in mentality from the north to the south and from the city to the villages. The work migration in recent years is also changing the people. Two persons interviewed wanted to describe it as that the people coming back from abroad have lost their spirit.<sup>75</sup>

During the soviet time the people got used to getting what they needed from the central government. You were asked to work, hard to take initiatives was not part of the system. Moldova is now moving toward a liberalized society. Slowly more and more people start to take initiatives.<sup>76</sup>

Many of the decisions taken by Moldovans are based on emotional arguments. One example is the huge expensive summerhouses built of concrete. Few afford to heat these houses.

Next to the big house there is usually a small, older house built of clay. Clay works better as insulation. This is where they squeeze in several generations during the winter. In the summer it is often considered too much work to move over to the summer house so they stay in the small one.<sup>77</sup>

Moldovans are in many cases reluctant to take risks. They keep the money in the mattress and almost never take loans.<sup>78</sup>

There is a will in many people to make things themselves. They build their own houses, grow their own food and construct different energy solutions themselves. They prefer to not go to the market to buy things.<sup>79</sup>



FIGURE 37: HOUSE BUILT BY THE OWNER FOR SOLAR ENERGY ABSORPTION. PHOTO TAKEN IN VORNICHENY BY ANNELIE KJELLBERG

<sup>72</sup>Ecosfera, REC Moldova, meeting 2009

<sup>73</sup>SalvaEco, EcoExpert meeting 2009-12

<sup>74</sup>Climate Change Office 2008

<sup>75</sup>Lozova, interviews 2009-2017

<sup>76</sup>Lozova, interviews 2009-2017

<sup>77</sup>Moldsilva, 2006

<sup>78</sup>Stamate, 2009

<sup>79</sup>Lozova, interviews 2009-2017





FIGURE 38: THREE GENERATIONS IN A SMALL WINTER HOUSE. PHOTO TAKEN IN LOZOVA BY ANNELIE KJELLBERG

Characteristic for the Moldovans in comparison to Swedish people is the short term planning energy. The hill where they were situated is now covered with houses. Wind energy is for them something beautiful and good. Of the people I interviewed in the villages there were few thoughts about the future. Long term plans were rare.

Many of the people I talked to and interviewed mentioned the deforestation as a problem. The forest is part of many traditional songs.

#### ACCEPTANCE

The people I have interviewed have mainly been very positive to renewable energy.

Some of them want to change what they already have.

Lozova has a history of windmills on one of the hills. Everyone remembers or has heard about this and it makes them very positive to wind energy.

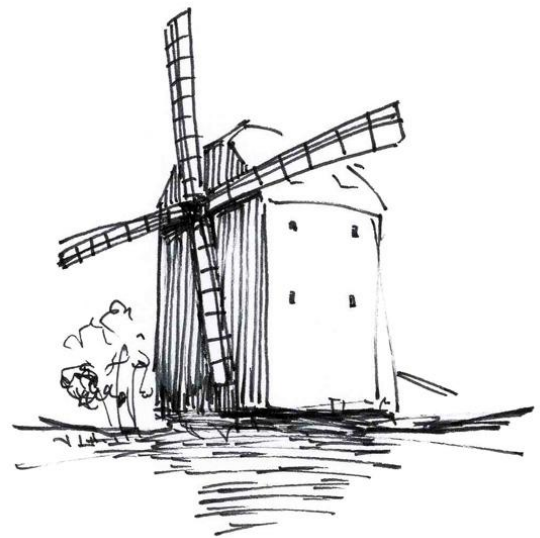


FIGURE 39: OLD WINDMILL. DRAWING BY ANNELIE KJELLBERG

<sup>80</sup>Lozova, interviews 2002-2009, 2017

<sup>81</sup>REAW, meeting 2009, 2006

Regarding solar energy people in Lozova are positive too. Some are reluctant to having their own installation as they think it will be very expensive and need a lot of work to put up. For one older man without higher education it seemed like a futuristic idea. One old woman would need it but maybe she would have considered it if her children lived at home.

When it came to asking the people in Lozova about their view on bio energy I explained how the REAW systems worked. They were positive. One teacher had seen the project and wanted for the school in Lozova. If they were reluctant the argument was that there were no specialists in the village, not enough money or a lack of knowledge.

The people I interviewed in Lozova had no opinion on hydropower as they thought they had no influence in this field.

If I would point out any tendencies in the answers it would be that people were more positive to what they had experience of or seen work well. People with higher education seemed more positive and young people had thought more about possibilities.

When it comes to convincing people efficient and cheap technology are important aspects to consider. To get the people acceptance demonstration projects are needed to show them that it works and how it works. The public institutions should come first. Kindergartens, schools and the primary schools are first priority in the village. The decisions should also be discussed with the local population.

## COOPERATION

It seems like people are prepared to cooperate if there is a bigger project. Most people also contribute with money. The people working abroad or coming back from abroad have more money but are less eager to cooperate. In Lozova there was recently a project building a road.

Most people joined together to help with work and some money.

## MARKET

Domestically there are two companies in Chisinau working with sun panels for thermal energy<sup>82</sup>. A private company with an ecological profile in Chisinau is currently importing PV from China. Thanks to REAW project they have two manufacturers of biomass boilers and a market in some areas of bailing and distributing agricultural residues. There is one company dealing with geothermal energy.

The energy market in Moldova is presently regulated by the government to some extent. It is moving towards a more liberalized market and the manager of the climate change office thinks that it would improve the situation.<sup>83</sup>

## ECONOMY

Moldova is the poorest country in Europe considering their GDP. One fourth of the population lives below the limit of poverty. The poverty is more concentrated in rural areas and smaller cities<sup>84</sup>. The salaries are very low. An average salary can be 1600 lei (SEK) per month even if they work 12 hours<sup>85</sup> a day.

The inflation is high, 12.8%<sup>86</sup>. Due to the high inflation, the interest rates are also high. It is normally 30% for a private investment which makes it almost impossible for people to take loans. Investments are therefore dependent on funding from abroad.

The yearly budget for a normal village is around 500 000 lei (MDL) (~330 000 SEK).

<sup>82</sup>Climate Change Office, meeting 2009-2-16

<sup>83</sup>Climate Change Office, meeting 2009-2-16

<sup>84</sup>Sida, 2007

<sup>85</sup>Lozova, interviews 2009-2-17

<sup>86</sup>IndexMundi, 2010-1-13

## MIGRATION AND YOUTH

Poverty gets very visible considering the amount of people migrating for work. There are few job opportunities in Moldova. How people get by at all is thanks to the money from people working abroad. Popular countries are Russia, where they can work legally, Italy, Spain, Greece, Germany and Turkey. Many work illegally, under bad conditions, without any rights in the receiving country. Reasons can be individual or part of family planning. The poverty is an important incentive but relative poverty is also of great importance. Migration makes the people vulnerable to trafficking. Moldova loses a big part of the youth in this

migration, especially the part taking initiatives. They feel that they do not have a future in Moldova. They cannot expect to get a job, make a career or get a salary that covers their basic needs, especially not if they intend to support a family. Most of the young continue university but often without an idea of what they want to work with. School is free for a lot of students. According to the people interviewed in Lozova there is a lack of activities for young people.

There are children growing up without parents due to the work migration. They receive money from abroad, drink, smoke and make a lot of trouble. A plan for the future is absent.



FIGURE 40: POSTER ADVERTISING FOR EMIGRATION TO CANADA. PHOTO TAKEN IN CHISINAU BY ANNELIE KJELLBERG







## ISSUES TO CONSIDER

What follows are issues in Moldova concerning renewable energy, energy in general, and aspects in society and the landscape affecting energy.

In this chapter I will go deeper into the problems that Moldova is currently experiencing. I will discuss the problems and in the next chapter write about the possibilities and how to handle these issues.

### LACK OF RESOURCES

As mentioned while describing the present situation in Moldova the country has a limitation in its resources. They have practically no fossil depots and they are now dependent on Russian gas. With the new aim of moving towards an EU membership, it has become important to create security in the energy sector with implementation of renewable energy (RE) as one tool. The options for RE are however also limited since there is very little wind and few rivers.

### INDOOR TEMPERATURE AND HEALTH

Energy is important for the single household in Moldova. Winters are cold and the population is poor. A big part of their income goes to heating. Energy has been subsidized for a long time. This has created a hole in the country budget. Now the subsidies are slowly being removed. This in combination with the fact that the prices for energy is increasing is making it difficult for the money lacking population to

heat their houses. The houses are poorly insulated which adds to the situation. In former times the houses were built out of clay which keeps the heat better. Nowadays, the general building material is concrete. Windows and doors are also leaking heat a lot. This situation forces big parts of the population to heat with wood in their sobas and old coal installations in their public buildings. Both have a very low efficiency and the coal is of poor quality with little heat value. In schools it is in some areas practiced 15 min lessons in order to let the children and teenagers warm up in between.

The harsh cold during the winters constitute in this case a health problem. In Antonesti in southeast Moldova they could earlier not afford to heat the school enough. The teachers report that both students and teachers got health issues, such as problems with kidneys or fertility, due to this. Today the school is heated with a biomass boiler from the REAW project.

### LITTER

The villagers often mention litter and garbage as a problem. When travelling across the country the dispersed litter is easily noticed. In the outskirts of villages there are large unofficial depots. The reason why there is not more litter is that people in general are economical with their resources. They reuse the bottles and jars. There have been projects to sort garbage. These projects have failed. The question is if awareness, interest management that failed.

The waste incineration plant that is now being built in Chisinau is maybe unrealistic in its proportions and planning. Ronny Arnberg, specialized in waste at Borlänge Energi claims that the calculations are unreasonable. According to Arnberg there is more waste needed for the plant than Moldova can produce. This will lead to import of waste, something connected with

FIGURE 41 (OPPOSITE PAGE) CLOSED FACTORY IN CAHUL  
PHOTO TAKEN BY ANNE KJELLBERG

a lot of regions. The closing of the former between city and countryside increased considerably.<sup>90</sup> The deposit is not taken into account and neither is the startup of a new one. The planned installation is not fulfilling EU level and Termocom, the thermal power supplier in Chisinau, is not consulted.<sup>89</sup> The breakdown of the kolkhozes during the privatization also destroyed the centralized technical sector. A major problem of soil erosion which is one of the biggest environmental problems of Moldova.

A lot of land is not in use due to their migration. It is hard to register all the plots in case of land consolidation.

Climate change is also decreasing the agricultural yield. It is getting drier and it affects the biodiversity.<sup>92</sup> The climate change will affect everyone, to various extents. Those who are most affected are people in poor countries who can do little or nothing about it. Moldova signed the UN Convention on Climate Change in 1995.<sup>93</sup>

Since Moldova is an agricultural country there are lots of residues. People are in general not able to use more than part of it. Some is taken as fodder for the animals and large amounts are just burned in the fields. The common sobas it is not possible to use straw. The burning of straw in fields is an ecological problem.

FIGURE 42: LITTER PHOTO BY ANNELIE KJELLBERG

## ISSUES CONCERNING AGRICULTURAL LAND

The structure of agricultural land is seen as a problem, mainly pointed out by authorities. The thin dispersed stripes of land create a lot of transportation. One family has 3 plots in average and it takes time to move between them. This situation puts a limit to the income of separate households and seriously affects the agricultural business. After the privatization they did not manage to revitalize the distribution network. There was a sharp decrease of production and this hit the people very hard. This resulted in great poverty in the villages and a strong migration to cities and abroad. The economical gap

## SHORTAGE AND LOW QUALITY OF WATER

The supply of water and water quality in Moldova is in general very poor. According to the Mayor in Lozova one out of 10 wells in the village have good water. During the soviet time the animals were kept together in farm buildings in the outskirts of village. Wells were drilled deep. It was hard to get the approval on digging your own shallow well. The privatization was carried out and the economic crisis made most animal farms stop their activities.

<sup>90</sup>Cernea, 2008

<sup>91</sup>Cernea, 2008

<sup>92</sup>Climate Change Office, meeting 2009

<sup>93</sup>Min. of Environment, 2000

<sup>94</sup>Lozova, interviews 2009 2-17

<sup>95</sup>Lozova, interviews 2009 2-17

<sup>89</sup>Annberg, email 2004 27



















































































