

# 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  
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Department of Landscape Architecture



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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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## ABSTRACT

The Republic of Moldova, situated in eastern Europe and a former part of the Soviet Union, is now experiencing a phase of transition in both society and landscape. They have hardly any fossil depots and are currently dependent on Russian gas, with 97% of their 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 tool is to increase the use of renewable energy sources.

Through interviews, texts, and visits I have studied the implementation of renewable energies (RE) in Moldova through a society development perspective. The study has aimed to investigate the socio-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: straw, other agricultural residues and pollarding. 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.

The cultural dimensions need to be respected when working internationally. Moldova's relatively collective 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 och är för närvarande beroende 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 är ett verktyg.

Genom intervjuer, texter och besök har jag studerat implementeringen av förnyelsebar energi i Moldavien ur ett samhällsutvecklingsperspektiv. Studien har syftat till att utforska det socio-tekniska problemkomplexet och att diskutera potentialen och hur man kan hantera ämnet 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 viktigaste tillgången är humankapitalet. Moldavien har en välutbildad befolkning med många internationella erfarenheter.

De kulturella dimensionerna bör respekteras när man arbetar internationellt. Moldaviens relativt kollektivistiska samhälle med en stark hierarki och deras tendens att undvika 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 at 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 the gap between the academic world and the professional world. My translator Sergio Ongriana has followed me around providing a linguistic and cultural translation as well as technical information. My assistant supervisor Karin Hammarlund, my technical consultant 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

<b>Abstract</b> .....	<b>3</b>
<b>Sammanfattning på Svenska</b> .....	<b>3</b>
<b>Foreword</b> .....	<b>4</b>
<b>Acknowledgements</b> .....	<b>4</b>
<b>Table of Contents</b> .....	<b>5</b>
<b>Abbreviations</b> .....	<b>7</b>
<b>Introduction</b> .....	<b>9</b>
<i>Background</i> .....	9
About Moldova.....	9
About the need to address the topic .....	9
<i>Aim and Objectives</i> .....	10
<i>Method</i> .....	10
<i>Focus</i> .....	13
<i>Structure of the thesis</i> .....	14
<b>Theory</b> .....	<b>17</b>
<i>Definition of Renewable Energy</i> .....	17
<i>The Cultural Dimensions of Management and Planning</i> .....	17
1. Collectivism / individualism.....	17
2. Large / small power distance .....	18
3. Strong / weak uncertainty avoidance .....	18
4. Masculinity / femininity .....	18
<i>Decentralization and Democracy</i> .....	18
<b>Present Situation in Moldova</b> .....	<b>21</b>
<i>Geography and Demography</i> .....	21
<i>Physical Structures</i> .....	24
Land use .....	24
Village structure .....	26
Infrastructure .....	27
<i>Energy Use</i> .....	27

Energy use in village.....	27
Domestic use of energy .....	28
<i>Renewable Energy in Moldova</i> .....	29
Renewable Energy Today.....	29
Ongoing Projects.....	31
<i>Politics and Governance</i> .....	32
Organization.....	32
Political Instability.....	32
Corruption.....	32
Legislation .....	32
<i>Mentality and Acceptance</i> .....	34
Mentality, Heritage.....	34
Acceptance.....	35
Cooperation .....	36
<i>Market</i> .....	36
<i>Economy</i> .....	36
<i>Migration and Youth</i> .....	37
<b>Issues to consider</b> .....	<b>39</b>
Lack of resources .....	39
Indoor temperature and health .....	39
Litter.....	39
Issues concerning agricultural land.....	40
Shortage and low quality of water.....	40
Deforestation .....	41
Example of failed project .....	41
Inflation.....	42
Migration .....	42
Climate for investments.....	42
Transnistria .....	42
Political instability .....	42
Culture .....	43
Gas the only alternative given .....	44
Awareness.....	44
Promotion .....	44
Bureaucracy and corruption .....	44
<b>Discussion of Possibilities - how to work with these issues</b> .....	<b>47</b>
<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
<b>Lozova – an example .....</b>	<b>61</b>
<b>Final Conclusions .....</b>	<b>65</b>
<b>Reflections.....</b>	<b>67</b>
<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
<b>Bibliography .....</b>	<b>71</b>
<i>Published sources</i> .....	71
<i>Internet sources.....</i>	72
<i>Oral sources.....</i>	72
Lozova, Straseni district .....	72
Other .....	73
<i>Pictures.....</i>	74

## ABBREVIATIONS

ANRE	National Agency of Energy Regulation
ASM	Academy of Sciences of Moldova
CAPMU	Consolidated Agricultural Projects Management Unit
CBM	Swedish Biodiversity Centre
CDM	Clean Development Mechanism
DNA	Designated National Authority
ELC	European Landscape Convention
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

RM	Republic of Moldova
SEK	Swedish krona (Swedish currency)
Sida	Swedish international development cooperation agency
TUM	Technical University of Moldova
UD	Ministry of Foreign Affairs, Swedish Government
UN	United Nations
UNDP	United Nations Development Program



## 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 that 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 unsustainable and unstable. I think that we will very soon 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<sup>1</sup>. 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 network for the agricultural products within the new system. The production fell dramatically and this led Moldova into a severe financial crisis<sup>2</sup>. Moldova is today the poorest country in Europe<sup>3</sup>. The economy is starting to recover but the situation has degraded the energy systems

FIGURE 1: PHOTO FROM LOZOVA, ANNELIEKJELLBERG

<sup>1</sup> Republic of Moldova, 2009-09-02

<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 depots. They cannot produce any amounts of their own natural gas, oil products or coal to speak of<sup>4</sup>. During the Soviet time resources in the union as a whole were abundant. This has put Moldova in a dependency situation with 97% of it's energy imported, almost exclusively from Russia<sup>5</sup>.

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<sup>6</sup>. The dependency on Russia is then seen in a



FIGURE 3: MOLDOVA IN USSR, AVAILABLE AT [HTTP://COMMONS.WIKIMEDIA.ORG](http://commons.wikimedia.org), 2010-04-26. EDITED BY ANNELIE KJELLBERG



FIGURE 4: MOLDOVA AND THE EU, AVAILABLE AT [HTTP://COMMONS.WIKIMEDIA.ORG](http://commons.wikimedia.org), 2010-04-26. EDITED BY ANNELIE KJELLBERG

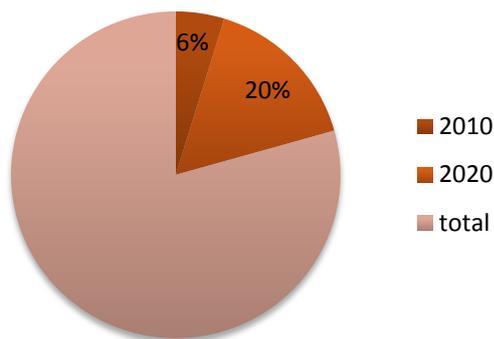
<sup>4</sup> Climate Change Office, 2008

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

<sup>6</sup> Sida, 2007

different light. An aim set up by the Moldovan government is to create an energy security in the country<sup>7</sup>. 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<sup>8</sup>. Also the options for renewable energy sources are limited. There is very little wind and few rivers. The energy sector is a key branch of the Moldovan economy and is important for maintaining social stability<sup>9</sup>.

% RES IN TOTAL ENERGY CONSUMPTION



According to Corneliu Marza, current vice minister at the Ministry of Environment in Moldova, Swedish specialists have difficulties understanding how it works in Moldova and how it's possible to do something new.<sup>10</sup>

## 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

development perspective. The study has aimed to investigate the socio-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, could 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, reading literature and discovering 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 socio-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 valuable 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 Swe-

<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 2009-11-09

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 RE-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 I could find that had been to Moldova or 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 forth coming meetings with people involved in the subject.

In Moldova I met up with NGO's, eco-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 UD 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, south-eastern, south-western, eastern and western parts. In the different locations I met



FIGURE 5: ANATOL SIRBU, MAYOR OF ANTONESTI, AND ME. PHOTO BY ANNELIE KJELLBERG

people, ordinary people and officials like mayors and project managers. After 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 transport but far enough away from Chisinau to be detached from the city and have a village character. Too close to Chisinau the village would rather be a suburban area. Most important was that I got helpful contact persons 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 whom I could find and whom I actively



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

searched for. Some I have met 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 "Forskningsintervjun –tekniker och genomförande" by Bill Gillham<sup>11</sup>. The original titel is "Research Interviewing: the range of techniques". I composed a document with the fields I wanted to cover in the interviews and developed possible questions within the fields that would be effective. I discovered more and more that I needed to position myself freely to 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 felt uncomfortable 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 interviews with academics, officials etc I didn't need a translator in many cases as their English was good. I transcribed all meetings afterwards.

Back in Sweden I have analyzed the interviews with the support of the book "Kvalitativ intervju, från vetenskap till fältstudier" by Anne Ryen<sup>12</sup>. Matt McCaffrey, the American Peace



FIGURE 7-8: 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 APA CANAL CHISINAU AS EMPLOYED BY BORLÄNGE ENERGI IN MARCH 2010 IN CHISINAU. PHOTO BY DANIEL GRAAN**

Since January I have also had an employment at Borlänge Energi coordinating their projects in Moldova. This has taken me back to Chisinau two times this spring. I have through my work 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 socio-technical 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 the 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 was 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, socio-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 in 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 the 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 referee 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 legislation. Most descriptions are defining RE by giving examples of what is included.

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

“Renewable Energy is derived from natural processes that are replenished constantly. In its various forms, it derives directly or indirectly from the sun, or from heat 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 renewable resources.”<sup>13</sup>

### 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 ANNELIE 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 “Cultural dimensions in Management and Planning” (Hofstede, 1983). It describes and 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 their 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 however 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 of “I” or “we”. It has consequences in for ex-

<sup>13</sup> IEA, 2009-10-16

ample business relationships and 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 economics 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 nor-

mally have specific types of professions. A feminine society is directed towards relationships. Modesty, caring 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 self concept. Neither masculine nor feminine culture is 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 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. According to C G Pickvance in "Decentralization and democracy in Easter Europe: a skeptical approach" (Pickvance, 1997) 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 can have considerable consequences on the amount of influence of the public.<sup>14</sup>

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 the text "Polyarchy" by Dahl R A (New Haven,

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<sup>14</sup>Pickvance, 1997, p. 130

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 operation of local and central governments. It depends on if 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<sup>17</sup>. 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<sup>18</sup>. 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 Tansnistria. It is a long and thin area all

along the eastern 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 Romanian with some words borrowed from Russian. In Gagauzia they speak Gagauzian and Russian. The people of Transnistria prefer Russian.



FIGURE 13: MAP OF MOLDOVA. FIGURE BY ANNELIE KJELLBERG

The topography of Moldova is a hilly plain sloping from north-west to south-east. 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), 2010-04-26

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

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

FIGURE 11 (OPPOSITE PAGE): MOLDOVA IN EUROPE. AVAILABLE AT [HTTP://COMMONS.WIKIMEDIA.ORG](http://commons.wikimedia.org), 2010-04-26

hydro power are limited. There are two bigger rivers. Nistru is between the self claimed autonomous region of Transnistria, called the left bank, and the rest of Moldova, called the right 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-

tinental regions in the north-east and the Mediterranean air from the south west. The climate is characterized by relatively mild winters, long and warm summers, and low humidity<sup>19</sup>. The duration of sun brightness is 2,100-2,300 h/year<sup>20</sup>. A considerable amount of the sun hours is between April – September with 1,500-1,650 h. There is not a lot of wind but enough to put up wind power turbines in some areas.

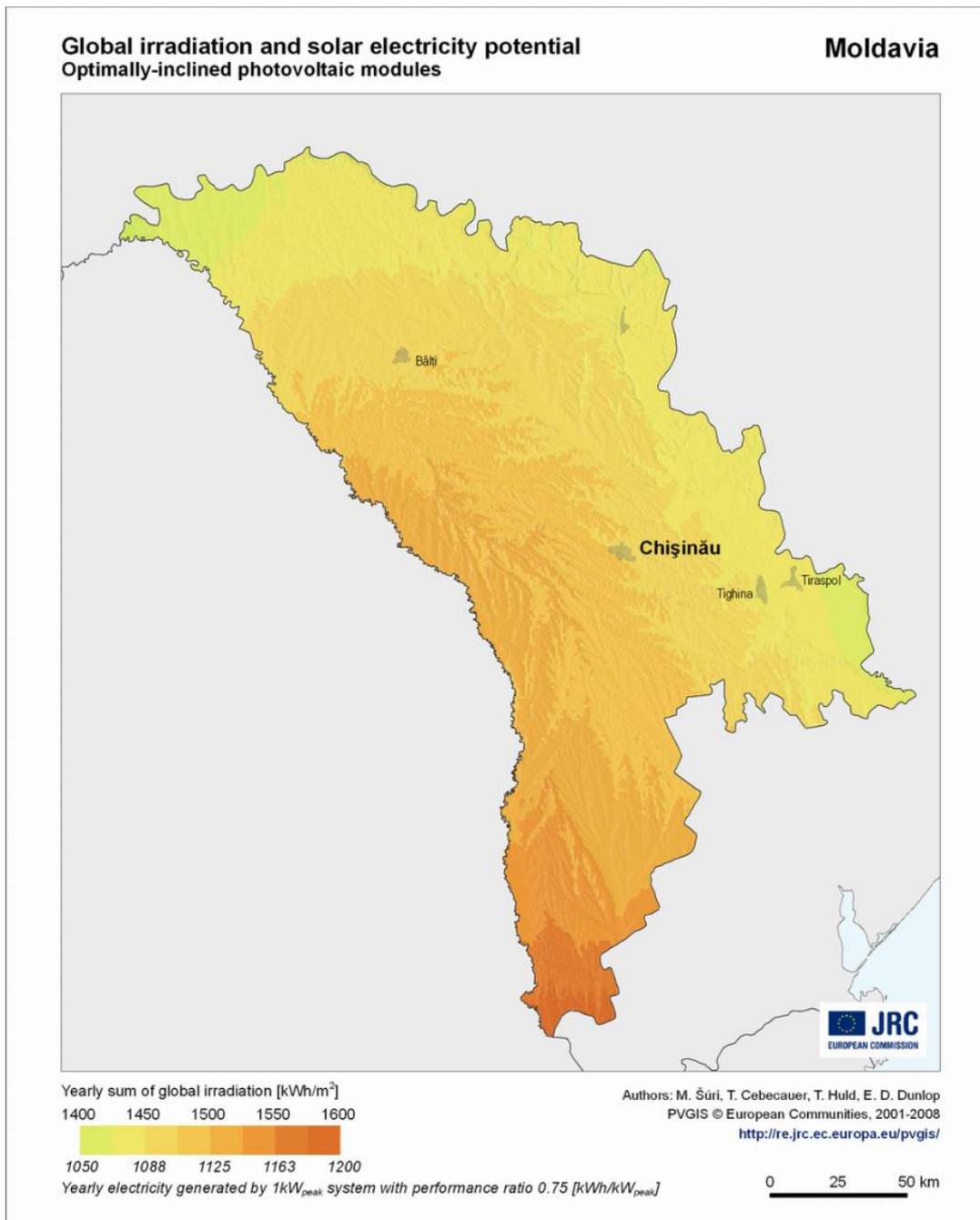


FIGURE 14: AVAILABLE AT [HTTP://RE.JRC.EC.EUROPA.EU](http://re.jrc.ec.europa.eu), 2009–10-29

<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, forest steppe and steppe<sup>21</sup>. The biotopes in the region around the nature reserve Codrii, close to Lozova in the central part of Moldova, in-



FIGURE 15-20: PHOTOS FROM THE CODRII RESERVE BY CAISIN VALERIU

cludes beech forest, sessile oak forest with beech, 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 relatively diverse with 15.5 thousand species<sup>23</sup>. Different types of deer, wild boar and the wild European cat are examples.



<sup>21</sup> Republic of Moldova, 2009-09-04

<sup>22</sup> Moldsilva, 2006

<sup>23</sup> Republic of Moldova, 2009-09-04

## PHYSICAL STRUCTURES

### LAND USE

The rolling landscape of Moldova is mainly cultivated (58.5%<sup>24</sup>). Agriculture, due to the fertile soil and the favorable climate, is the main resource in Moldova. The industry is mostly based on processing raw materials from the agriculture. 45% of the active labor force is involved in the agricultural production<sup>25</sup>. 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. A Kolkhoz was run by a collective while the Sovkhoz was run by the state. In practice there was hardly any difference. An Interfarm was a cooperation between farms. The main export was wine and tobacco and is still to this time.



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

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

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 is 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 (laga 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 socio-economic liberty for farm workers, stimulate the export of agricultural products, improve the living standards of peasants with better working conditions and social protection, and last, 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 non-urban areas is increasing.<sup>28</sup>

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

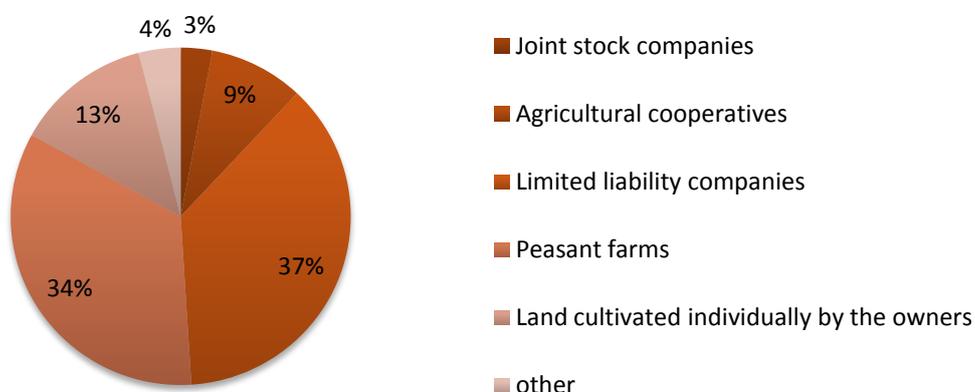
<sup>25</sup> Cernea, 2008

<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 2007  
(CERNEA, 2008)



There are large amounts of agricultural waste consisting of mainly straw but also sunflower stalks, twigs from grapevines and fruit trees and residues from corn. Of the straw they take what they need for their animals and burn the rest, which is the main part, in the fields.<sup>29</sup>



FIGURE 22: FACTORY PRODUCING ANIMAL FODDER IN CAHUL CLOSED DOWN DURING THE ECONOMIC CRISIS. PHOTO BY ANNELIE 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<sup>30</sup>. There are four nature reserves in Moldova; Codrii near the village of Lozova is one of them. It covers 5,176 ha. Total area of forest reserves is 18,226



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

ha<sup>31</sup>. The academy of science is now working with a project of afforestation<sup>32</sup>.

<sup>29</sup> REAW, meeting 2009-11-06

<sup>30</sup> Caisin, meeting 2009-12-08

<sup>31</sup> Statistica Moldovai, 2008

<sup>32</sup> ASM, meeting 2009-11-05

### VILLAGE STRUCTURE

Villages are mostly made up of single 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 obligatory rounds 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<sup>33</sup>.



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>3</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 2009-11-26 – 2009-12-17

<sup>34</sup> Lozova, interviews 2009-11-26 – 2009-12-17

## 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 without gas retrieval, with some exceptions, one mentioned in the chapter “Renewable Energy today”. There have been projects to sort the 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<sup>36</sup>. 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 TAKEN 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<sup>37</sup>. It can be distilled but that requires expensive energy. In Lozova only about one out of 10 wells has good water<sup>38</sup>. Around 85% of the rivers are more or less contaminated<sup>39</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 at high poles. People paid 8 or 9 leis per month. The bulbs broke down quickly, no one replaced them, and it left an unsatisfied population without lighting.<sup>40</sup>

The period per 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 bad.<sup>41</sup>

<sup>35</sup> SalvaEco, EcoExpert, meeting 2009-11-12

<sup>36</sup> Lozova, interviews 2009-11-26 – 2009-12-17

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

<sup>38</sup> Lozova, interviews 2009-11-26 – 2009-12-17

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

<sup>40</sup> Lozova, interviews 2009-11-26 – 2009-12-17

<sup>41</sup> Lozova, interviews 2009-11-26 – 2009-12-17

### DOMESTIC USE OF ENERGY

Soba is the traditional and still widely used way to heat the private 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 and 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



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



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

start the fire and coal or wood 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 m<sup>3</sup>/family. 10 m<sup>3</sup> or little less is used per year. This wood often comes from villages 70-80 km away. It cost 4000 lei /truck (~3000 SEK) which correspond to around 10 m<sup>3</sup>. 4000-5000 lei (~3000 SEK) according to one person I interviewed.<sup>43</sup>



FIGURE 30: WOOD – A COMMON FUEL. 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 SEK).<sup>44</sup>

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 2009-11-26 – 2009-12-17

<sup>43</sup> Lozova, interviews 2009-11-26 – 2009-12-17

<sup>44</sup> Lozova, interviews 2009-11-26 – 2009-12-17

<sup>45</sup> Lozova, interviews 2009-11-26 – 2009-12-17

Gas costs maybe twice as much as wood, 7000 – 8000 lei (MDL) (~5000 SEK)/year, but considering the amount of work associated with wood, many think it is worth it. It is considered clean and comfortable.<sup>46</sup>



FIGURE 31: COMBINATION SYSTEM. PHOTO TAKEN IN CAHUL BY ANNELIE KJELLBERG

In Lozova there are several factories producing wooden boxes for fruit. The villagers can get the residue sawdust cheap, 50-100 lei (MDL) (~35-65 SEK) /truck and year. 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 one 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

systems. Cow manure is burned for heating in some parts of the country where they have more cows and less wood.<sup>47</sup>

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 the 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 a hold of as much information as possible.

An example of a successful project on renewable energy in Moldova is "Renewable Energy from Agricultural Waste" (REAW). It took place 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 heat water in an accumulation basin. It is a central heating system. The first phase was to put up the demonstration units. Second phase was to

<sup>46</sup> Lozova, interviews 2009-11-26 – 2009-12-17

<sup>47</sup> Lozova, interviews 2009-11-26 – 2009-12-17

<sup>48</sup> Lozova, interviews 2009-11-26 – 2009-12-17

<sup>49</sup> Lozova, interviews 2009-11-26 – 2009-12-17



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

establish a supply chain of biomass with a straw bale market. The third phase funded public awareness campaigns to reduce the information barrier for using RES.<sup>50</sup>

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.<sup>51</sup>



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

One man in Antonesti built his own installation inspired by the biomass boilers installed by REAW.

Bio-fuel is produced in Moldova but exported to Germany where it is upgraded and used.<sup>52</sup>

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-Italian company "Biogas Inter Ltd".<sup>53</sup>

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<sup>54</sup>.

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>55</sup>.

<sup>52</sup> Climate Change Office, meeting 2009-12-16

<sup>53</sup> Taranu, email 2010-01-16

<sup>54</sup> Lozova, interviews 2009-11-26 – 2009-12-17

<sup>55</sup> Lozova, interviews 2009-11-26 – 2009-12-17

<sup>50</sup> CAPMU, 2008

<sup>51</sup> REAW, meeting 2009-11-06

Geothermal energy is rarely used but has been installed in some places during the last year<sup>56</sup>.

According to the definition, the widely used wood (and sawdust) is also a renewable energy source. The state forestry agency "Moldsilva" delivers 250-350 m3 of wood per year that 60 or 70% of the rural population buys to heat their houses<sup>57</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.

During my meeting with the vice director of the department of Architecture at Chisinau City Hall he told me that a new general spacial plan of the municipality of Chisinau was recently approved. Renewable Energy was not taken into consideration.<sup>58</sup>

## ONGOING PROJECTS

"Use of Biomass as Energy Source in Rural Communities" (Projects 1 and 2) is a CDM project in partnership with the World Bank's Prototype Carbon Fund (PCF). It started in the second half of year 2005. It concerns the implementation of 250-300 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>59</sup>

"Biogas Recuperation in Energy Production at Tintareni Landfill" was presented as a CDM project to the Designated National Authority (DNA) for approval early in year 2009. It concerns the station for biogas capture mentioned

earlier. 13 of January 2010 it was not yet approved.<sup>60</sup>

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 the company "STR Engineering Consulting" LTD from Italy about the project.<sup>61</sup>

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>

Wind energy is also being planned in 5 different regions from the north to the south, in total 200MW.<sup>63</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 PV-cells. The objective is to test the technology and to demonstrate it to the public, increasing awareness and acceptance.<sup>64</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>

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<sup>56</sup> Ongriana, 2009-11-26

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

<sup>58</sup> Blaj, meeting 2010-03-26

<sup>59</sup> Taranu, email 2010-01-16

<sup>60</sup> Taranu, email 2010-01-16

<sup>61</sup> Taranu, email 2010-01-16

<sup>62</sup> Climate Change Office, meeting 2009-11-06, Taranu, email 2010-01-16

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

<sup>64</sup> ASM, meeting 2009-11-05

<sup>65</sup> Gavrilita, email 2010-02-05

## 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)<sup>66</sup>. Bureaucracy is still strong with a clear hierarchy. A young person with initiatives might feel inhibited to act on them not to violate the hierarchy.



FIGURE 34: THE PRIMARIA 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. PHOT 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-in 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: Methodology for the Determination, Approval and Application of Tariffs for the Electricity Generated from Renewable Electric Energy and Bio fuel, ANRE Resolution No. 321 from 22.01.2009, and ANRE Resolution No. 330 from 03.04.2009 on approving the Regulation on the Guarantees for Origin of Electricity Generated from Renewable Electric Energy and Bio fuel.<sup>71</sup>

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

<sup>67</sup> Ecosfera, REC Moldova, meeting 2009-11-09

<sup>68</sup> Transparency international, 2009-09-02

<sup>69</sup> Climate Change Office, meeting 2009-11-06

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

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



FIGURE 36: ADMINISTRATIVE MAP. AVAILABLE AT [HTTP://COMMONS.WIKIMEDIA.ORG](http://commons.wikimedia.org), 2010-04-26.

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 (ANRE) 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 partly formed 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 recent years is also changing the people. Two persons I interviewed wanted to describe it as that the people coming back from abroad had lost their spirit<sup>75</sup>.

During the soviet time the people got used to getting what they needed from the central governance. You were asked to work, not to think. Taking 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<sup>78</sup> and almost never take loans.

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 BEING BUILT BY THE OWNER FOR SUN ENERGY ABSORPTION. PHOTO TAKEN IN VORNICHENY BY ANNELIE KJELLBERG

<sup>72</sup> Ecosfera, REC Moldova, meeting 2009-11-09

<sup>73</sup> SalvaEco, EcoExpert, meeting 2009-11-12

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

<sup>75</sup> Lozova, interviews 2009-11-26 – 2009-12-17

<sup>76</sup> Lozova, interviews 2009-11-26 – 2009-12-17

<sup>77</sup> Moldsilva, 2006

<sup>78</sup> Stamate, 2009

<sup>79</sup> Lozova, interviews 2009-11-26 – 2009-12-17



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. Of the people I interviewed in the villages there were few thoughts about the future and 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.<sup>80</sup>

### ACCEPTANCE

The people I have interviewed have mainly been very positive to renewable energy. Some people with the "Soviet mind" are reluctant to change what they already have<sup>81</sup>.

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. The hill where they were situated is now covered with houses. Wind energy is for them something beautiful and good.

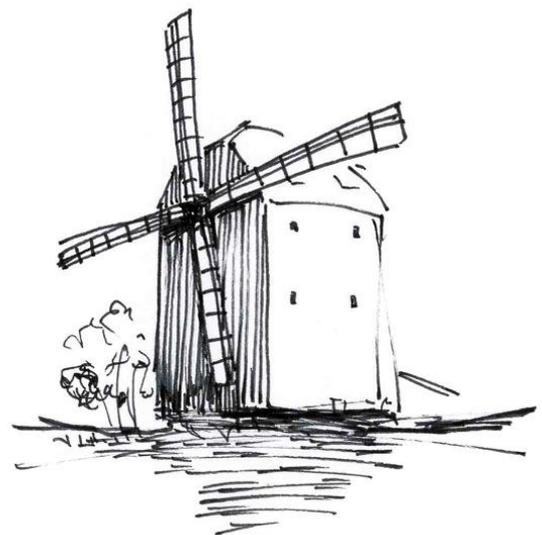


FIGURE 39: OLD WINDMILL. DRAWING BY ANNELIE KJELLBERG

<sup>80</sup> Lozova, interviews 2009-11-26 – 2009-12-17

<sup>81</sup> REAW, meeting 2009-11-06

Regarding solar energy people in Lozova were 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 answered she didn't 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 it 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 the possibilities.

When it comes to convincing people, efficient and cheap technology are important aspects to consider. To get the people's acceptance, demo projects are needed to show them that it works and how it works. The public institutions should come first. Kindergartens, schools and the primaria are first priority in the people's mind. 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 would also contribute with money. The people working abroad or coming back from abroad have more money but are less eager to cooperate or contribute according to my interviews. 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-cells from China. Thanks to the 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 (~1000 SEK) per month even if they work 12 hours a day<sup>85</sup>.

The inflation is high, 12.8% in 2009<sup>86</sup>. Due to the high inflation, the interest rates are also high. It is normally 20-30% 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).

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<sup>82</sup> Climate Change Office, meeting 2009-12-16

<sup>83</sup> Climate Change Office, meeting 2009-12-16

<sup>84</sup> Sida, 2007

<sup>85</sup> Lozova, interviews 2009-11-26 – 2009-12-17

<sup>86</sup> Index Mundi, 2010-01-13

## 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 coming 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 the 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 to 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 I 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<sup>87</sup>. With the new aim of moving towards an EU-membership, it has become important to create a 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 big 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

**FIGURE 41 (OPPOSITE PAGE): CLOSED FACTORY IN CAHUL. PHOTO TAKEN BY ANNELIE KJELLBERG**

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<sup>88</sup>. 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 it was awareness, interest, or 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

<sup>87</sup> Climate Change Office, 2008

<sup>88</sup> Antonesti, meeting 2009-12-03

a lot of regulations. The closing of the former 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>

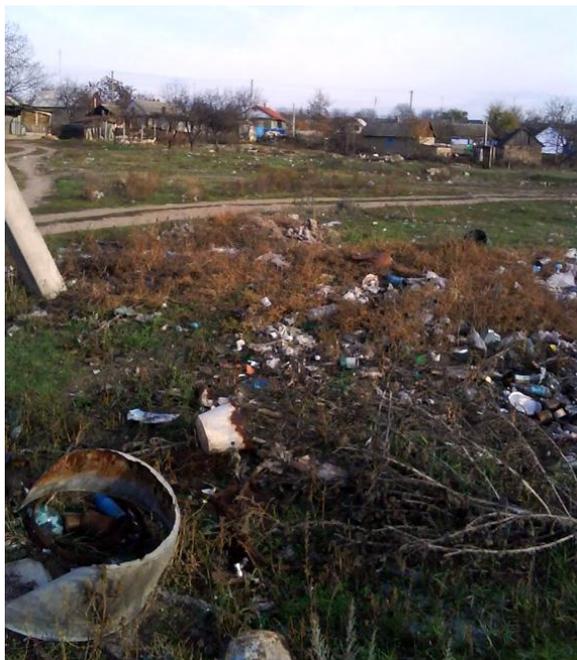


FIGURE 42: LITTER. PHOTO BY ANNELIE KJELLBERG

#### 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 agro 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

between city and countryside increased considerably.<sup>90</sup>

The breakdown of the kolkhozes during the privatization also destroyed the centralized zoo technical sector<sup>91</sup>. This is enhancing Moldova's problem of soil erosion which is one of the biggest environmental problems of Moldova.

A lot of land is not in use due to the work 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<sup>94</sup>. In the common sobas it is not possible to use straw. The burning of straw in the fields is an ecological problem.

#### 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<sup>95</sup>. 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 2009-11-06

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

<sup>94</sup> Lozova, interviews 2009-11-26 – 2009-12-17

<sup>95</sup> Lozova, interviews 2009-11-26 – 2009-12-17

<sup>89</sup> Arnberg, email 2010-04-27



FIGURE 43: SHALLOW WELL. PHOTO BY ANNELIE KJELLBERG

Animals were taken to the private property where also outdoor toilets are common. Water toilets also run directly out in nature. Shallow wells became free to dig. All this is strongly polluting the water. They cannot afford to dig deep wells. During the summertime it can become a big problem, for example in Lozova. It is hard for the poor people and not sustainable to buy water. All year round in Lozova people transport water by car or other means from the wells with potable water. The situation needs to be handled immediately.

#### DEFORESTATION

Deforestation is an important issue. Where there were 10 trees there is now 2<sup>96</sup>. During the last 20 years it has become far less trees in the village landscape. Wood is also taken from the forests. It is used for heating the houses. For the poor people it is difficult to afford to buy materials for heating the badly insulated houses. In the Codrii reserve, some trees that people are allowed to take are marked with a special sign. According to the personnel of the reserve this is respected but not according to the villagers and the mayor of Lozova. Other trees are also taken to make furniture or boxes. The villagers describe it like some kind of mafia dealing with wood. The deforestation is making



FIGURE 44: MARKS ON TREES FOR CUTTING IN THE CODRII FOREST NEAR LOZOVA. PHOTO BY ANNELIE KJELLBERG



FIGURE 45: WOOD CHOPPING FOR FUEL. PHOTO BY ANNELIE KJELLBERG

the situation with landslides and land erosion worse.

<sup>96</sup> Lozova, interviews 2009-11-26 – 2009-12-17

### EXAMPLE OF FAILED PROJECT

There have been a number of projects with the aim to produce biogas. In Vadul lui Voda a biogas producing installation was built in close parameter to a poultry factory. During the economic recession the poultry factory reduced their chicken production with 60%. Without enough materials they were forced to shut down the biogas installation. Transportation of biomass from other sources would have been too expensive. The installed plant had an effect of 845 kW to produce both electricity and heat. The heat had no usage as it was not connected to any network. The interest from local businessmen is unfortunately low. They look for fast payback on their investment and 5-6 years is too long. Other investments are more profitable in short term.<sup>97</sup>

### INFLATION

In recent years the inflation has been very high, around 12%<sup>98</sup>. This is affecting the interest rates for taking loans in the banks. Generally it is around 20–30%<sup>99</sup>. For a normal citizen it is almost impossible to take a loan. The reluctance to take risks is also adding to this situation. For the implementation of renewable energy to the general public for installations in the size of one household it is the most important issue. Also for organizations or villages this is a barrier almost impossible to overcome.

### MIGRATION

The work migration is enormous. This is a great social problem that has consequences in all parts of society. Strong family connection is sometimes lost and the migrants care less about their community in Moldova. It is a brain drain and especially the young people taking initiatives are lost.

### CLIMATE FOR INVESTMENTS

The climate for investments in Moldova is not favourable. Joining the EU would probably start a fast process of growth and development in the same direction as the members of the EU. This would create a much better climate for investments. A lot of money would become available for Moldova to work with pilot projects or public awareness for example. The people have seen it as a futuristic utopia for some time. Things are however starting to change.

### TRANSNISTRIA

The biggest concern about the possibility to enter the EU is the situation with Transnistria. Shortly after the declaration of independence in 1991, Transnistria wanted to break loose, and there was a war between the two parts. The strife took the initial form of a protest against the Moldovan Language Law<sup>100</sup>. According to Moldovan sources it was Russian troops and strategic movement of key people during the Soviet period that caused it<sup>101</sup>. Transnistrian (or Priednestrovian as they call the area themselves) sources claim that they only want to be independent like other small states in Europe<sup>102</sup>. This conflict is not possible to bring into an EU membership<sup>103</sup>.

When the area practically broke loose from the rest of the country, most of Moldova's own energy production ended up within their borders. Transnistria as well as the rest of Moldova is using Russian gas for most of its energy consumption. The purchasing of gas goes through Moldova. Transnistria refuses to pay and this is creating a big financial problem for Moldova<sup>104</sup>.

<sup>97</sup> Climate Change Office, meeting 2009-12-16

<sup>98</sup> Lozova, interviews 2009-11-26 – 2009-12-17

<sup>99</sup> Lozova, interviews 2009-11-26 – 2009-12-17

<sup>100</sup> Moldova.org, 2009-09-02

<sup>101</sup> Moldova.org, 2009-09-02

<sup>102</sup> Visitpmr, 2009-09-02

<sup>103</sup> Halvarsson, meeting 2010-02-07

<sup>104</sup> Halvarsson, meeting 2010-02-07

### POLITICAL INSTABILITY

Moldova has also got political issues in their own corridors of power. The Communist party, which has been ruling since the independence from Soviet Union, lost their reign in April 2009. Since then, the nation has been without a president. It has proven to be hard to elect a new one with their new parliamentarian system. When I visited the country in February 2010 there was still no president. A citizen in Lozova describes it like a family without a father. The instability is scaring potential investors away since an investment in this context is too big a risk.

### CULTURE

Further reasons to why there is not more RE in Moldova or why the field is not further developed can be found in a number of social factors that affect the situation, factors that have to do with the present Moldovan culture and mentality. It has to be pointed out that the population is very competent with big potentials but some general attributes are less favorable in the perspective of RE implementation. I will now discuss such issues.

In comparison with Sweden, planning is relatively short sighted. The unstable political situation may have caused this. There is no sense in planning more long term. That is why people look for investments that have a shorter pay-back time than what RE projects demand. Also because of this, people do not have the awareness that the price of gas probably will rise even more, and the ongoing gas pipe net enlargement with the aim to heat houses with gas might be unnecessary or even a bad idea. The perspective that it could be profitable to install sun panels, in the long run, is rare.

Initiatives are needed to radically change the entire energy system of a country. This is an issue in Moldova. They are starting to adopt this after being fed during the whole Soviet



FIGURE 46: MOLDOVAN HOME. PHOTO BY ANNELIE KJELLBERG

period. People were asked to work, not think<sup>105</sup>. The people taking initiatives these days are moving abroad. They feel that the situation is too hopeless after the economic recession.

It is part of the Moldovan mentality to not want to take risks. Not only is the economic situation keeping people from taking loans, they do not want to either. Olesea Stamate from the Soros foundation in Moldova wrote in the article "Europas fattigaste klarar krisen bäst" (transl. Europe's poorest handles the crisis best) in Expressen last summer that the thing about keeping the money in the mattress as is common in Moldova may have saved them from the economic crisis that struck a large part of the world recently<sup>106</sup>. Moldova was hardly affected. The reluctance to risks also manifests itself in the fact that most people produce their own food. It will also require a lot before the public give up their wood fired sobas. The sobas would save them in an energy system collapse. The problem about this part of the mentality re-

<sup>105</sup>Lozova, interviews 2009-11-26 – 2009-12-17

<sup>106</sup>Stamate, 2009

garding the issue of RE is that few will take the risk to invest in RE technology privately.

#### GAS THE ONLY ALTERNATIVE GIVEN

For most people, gas is the only offered alternative to wood and coal in the soba. The gas is seen as a clean and comfortable energy source. The gas net is being enlarged in a big project. The aim of the project is to make all citizens connected to the net. It is a huge project with a huge investment that needs to be recovered before starting something new. Gas is modern in Moldova. The issue about modernity needs to be considered implementing bio energy. It is mentally connected to energy use in the old times and not as a part of the future. Regardless of the fact that people want and need cheap energy, it does not work to install old systems that have been replaced in Western Europe. It will not be appreciated but a symbol for being behind in development. There have been such projects that failed<sup>107</sup>.

#### AWARENESS

If you ask the villagers about why there is not more RE one part of the answer is that there are too few specialists. My perception is that there is a general lack of knowledge about RE both among well educated spheres and less educated ones (with the exception of people working directly in this field). Old, non educated people in the villages do not even know what you are talking about. Maybe they saw windmills when they were children but that is all. Public awareness has been an important part of several projects but it is definitely something to look more into. Another thing that is important for the local energy development is the effort and interest of the mayor regarding this topic. An active mayor makes a big difference.

#### PROMOTION

Promotion of RE is an issue that needs to be addressed. There is a lack of promotion for RE. According to Sergiu Robu at the Academy of Science in Moldova there is no knowledge about RES and no legislative background to promote this technology. Five or six years in payback time is too long, the interest rate is too high.<sup>108</sup>

In the project document for Moldova Biomass Heating in Rural Communities Project (PDD nr1) you can read:

“There are no sectoral or national policies that would require use of biomass or other cleaner fuels. Also there are no policies that would provide incentives to use biomass as a fuel.”<sup>109</sup>

#### BUREAUCRACY AND CORRUPTION

The bureaucracy is substantial in Moldova. Maybe simply because it takes time to change an entire society. The organization is based on strong hierarchy. What they seem to have is a quite unproductive system. When making a change the process is very time consuming and complicated. A lot of certificates and stamps are needed. One way for people to get around this is through corruption. You pay and do not have to get all the papers. The corruption can also for example show when a business turns profitable it may be taken over or forced to payment by illegal means<sup>110</sup>. In some way the situation is accepted by the people. In the short term it is beneficial to both parties. A driver can exceed the speed limit and the police get some money. A person that can cheat himself to some money is in many cases seen as smart instead of having bad morals. Some people with a lot of money today got it in a less honest way during the privatization. Corruption in Moldova can almost be seen as organized and

<sup>107</sup> Ecosfera, REC Moldova, meeting 2009-11-09

<sup>108</sup> Climate Change Office, meeting 2009-12-16

<sup>109</sup> UNFCCC, 2005

<sup>110</sup> Euronews, 2009-06-13

goes far up in the organization. Money is law. There exists an anti-corruption ministry that is part of the police force. It is also obvious after spending some time in the country that white lies are commonly used in everyday life to get out of tricky situations.

Moldova is burdened with many problems and have during later years experienced a feeling of hopelessness among the population. They feel a hopelessness for the future. Perhaps it is needed to come there with fresh eyes in order to see the possibilities.



## DISCUSSION OF POSSIBILITIES

### - HOW TO WORK WITH THESE

### ISSUES

It is important to be aware of the issues Moldova has. They need to be understood to be able to work with solutions and to see the possibilities, because the possibilities in and for Moldova are enormous. It is about human resources, physical resources, will, the openness, and the need. The need constitutes an important incentive for change.

### MOLDOVAN CULTURE IN

### MANAGEMENT AND PLANNING

To be able to work with the issues of Moldova your management and planning needs to be in tune with the Moldovan society. This is needed in order to be able to work effectively and avoid unnecessary misunderstandings.

Geert Hofstede's article "Cultural Dimensions of Management and Planning" (Hofstede, 1983) displays a list of 50 countries where they are given a value and ranked in the four dimensions described earlier. Moldova is not one of them but Sweden is. I will now discuss Moldova's possible positioning in this value system in comparison to Sweden.

My background is studies in landscape planning. My knowledge of the professional planning and management and its cultural context in Sweden is therefore based on my experiences during my education where I have had lectures, met and discussed with professionals

FIGURE 47: GHEORGE LOZOVANU AT HIS HOUSE IN LOZOVA. PHOTO BY ANNELIE KJELLBERG

and made an internship at a municipality for two months. For my bachelor thesis I interviewed planners at municipalities about their possibilities to work for ecological sustainability. During this spring I have also had a project employment at the Swedish company Borlänge Energi, managing their projects in Moldova and Romania.

### DEGREE OF COLLECTIVISM IN MOLDOVA

Sweden is in top 10 in individualism with a value of 71 (out of 100). I want to argue that Moldova is a more collectivistic society. This can be related to the differences in economic development although Moldova is moving in the direction of a more individualistic society. Children of Moldova are brought up as part of the tightly knit social framework. They can expect their relatives to take care of them. Many 25 year olds live together with their parents and grandparents. There is no shame in being dependent on relatives for economic support. The modern capitalist economic assumption laid out in the 18<sup>th</sup> century about the individual's motivation of self interests have less support in Moldova than in Sweden.

It is not as bad in Moldova to employ relatives as it is in Sweden. Business life is more integrated with private life in Moldova. It seems that in a successfully established work relationship you are also included in the circle of friends and relatives.

As openness and directness is preferred in Sweden, conflicts should be treated differently in Moldova. Working in Moldova a more indirect communication should be practiced. A conflict between two people could be solved by a third party, a go-between.

### HIERARCHICAL SYSTEM

The power distance in Moldova is greater than in Sweden. This could also be partly explained

by the difference in economic development. Institutions and organizations in Moldova have a strong hierarchy. It can be difficult for them to understand the Swedish system with a small power distance.

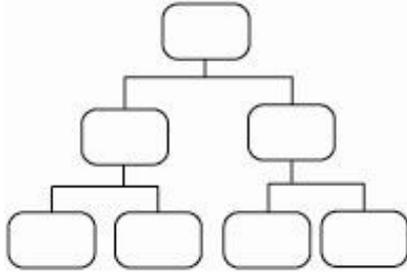


FIGURE 48: CONCEPTUAL FIGURE OF HIERARCHY. BY ANNELIE KJELLBERG

In Sweden it is positive to work independently as a subordinate. Moldovan employees are more instructed from above and need micro-managing. The boss is like a good father. In school, teachers in Moldova are seen as sources of wisdom, their teachings never openly disputed. Swedish teachers encourage their students to be independent and to contradict them. This carries on to the work situation.

Status difference is undesirable in Sweden and when there is a difference, it is not displayed much. Power and wealth do not need to coincide. In a society with larger power distance they do coincide and authority and respect comes with it. The status of the superior gives status to the subordinate in the outside world.

Distinct for Sweden and other countries with small power distance is the need for subordinate consultation. This is carried so far in Sweden that there are consultative rituals, meetings, even if the subordinate's contribution to the decision is likely to be very small. The paternalistic system in Moldova does not mean that they more often abuse power. A paternalistic superior that respects the norm of the society is not abusing power. A consultative superior that manipulates consultation rituals does.

## AVOIDING UNCERTAINTIES AND RISKS

Sweden ranks low on the list for uncertainty avoidance. My perception is that Moldovans have a much bigger need for standardization. They have rituals such as a frequent use of stamps on documents, standardization of meetings and extensive use of different certificates. According to Geert Hofstede these formalizations are important to keep the emotional equilibrium.

Cultures with high avoidance of uncertainties give much more top management attention to short term and medium term scheduling. And this is also true for Moldova. Countries with a low avoidance of uncertainties like Sweden are strong on strategic planning.

Strong uncertainty avoiding cultures are supposed to have a more hurried atmosphere. Time is something to be mastered. This is something I haven't experienced in Moldova. What could speak for this argument is that they are eager to get physical results in their projects.

The more tolerated expression of emotions, like raising ones voice and pounding the table, is also not something that I have found in Moldova. In this aspect I think both Sweden and Moldova are quite timid. What I do find is a strong emotional honesty. People do not put on a face in Moldova.

Deviant people are not very tolerated in Moldova. The HBT pride parade planned last year was stopped by violence far ahead of the planned start. People with a dark skin color get a lot of hostile attention. Compared to other countries in the region I have understood that Moldova anyhow is quite mild.

## CULTURAL VALUES

Whether Moldova is a more feminine or masculine society I would probably put them more on the feminine part of the scale. Sweden is an extremely feminine society and ranked number

one in the list of Geert Hofstede. The society in Moldova is also not built on competitiveness or achievement. Sympathy lies foremost with the weak. Quality of life is important. When making a new investment, schools and kindergartens are prioritized. What speaks for the masculine type of society is how men and women are fixed in different types of jobs. Women should work with paper, in shops, with beauty or caring professions. Hard labor and technical jobs are for men. There is this tendency in Sweden too but not at all to the same extent.

## RESOURCES

### HUMAN RESOURCES

The human resources in Moldova are a great potential. It is only a question of taking care of it. The work migration has given Moldova a very international population with experiences from big parts of Europe and Russia. It is a very flexible population and it is easy for them to adjust to new circumstances. The bilingual since childhood is a fantastic quality. With one Slavic and one Latin language, it is easy for them to learn new languages. Many of the persons working abroad have the intention to go back. What is needed is a bright vision of the future in their home country. They need to be able to support themselves in Moldova and they need to feel that something is about to change the situation. It is also a very well educated population. Most students continue to university and a lot of them graduate.

### PHYSICAL RESOURCES

Regarding the physical resources, there are more than enough. There are hardly any fossil fuel resources but this can be seen as an advantage. Thus, the more reason to focus on an environmentally superior alternative: renewables. The potential of biomass, hydro energy, solar and wind energy has been estimated to 2.7 mtoe<sup>111</sup>. There are currently several

projects and existing RE in Moldova as described in the chapter about the present situation. The amount is however small compared to the amount in Sweden and the potentials in Moldova.

### BIOMASS

Concerning Bio energy there are lots of possibilities. Moldova is an agricultural land and the residues should be taken care of and be used. Only the straw in the country is enough to heat all buildings. It would also solve the ecological problem that the burning of straw in the fields is causing. The biomass boilers existing at this point in some areas of Moldova have a high efficiency. This creates jobs since the straw need bailing and transport and boilers need to be managed. The farmers will get some extra money and the money will stay within the state borders. Other agricultural residues could be used in the same installations. Straw burning energy is however not suitable for the 5 biggest cities and towns. Transportation and storing is



FIGURE 49: STRAW. PHOTO TAKEN IN ANTONESTI BY ANNELIE KJELLBERG

<sup>111</sup> Ministry of Industry and Infrastructure, 2007

the problem.<sup>112</sup>

To keep the animals in the yard is nice and has its advantages but there is a point in keeping the animals together in the outskirts of the village. With a more concentrated keeping of animal husbandry it would be much easier to use the manure to produce biogas. After the fermentation the material can be used as enhanced fertilizer in the fields. The ashes from burning the straw in biomass boilers can be used in the same way. The enlargement and modernization of the existing gas network is



FIGURE 50: WELL. PHOTO TAKEN IN COMRAT, GAGAUZIA, BY ANNELIE KJELLBERG

then positive in the sense that the biogas more easily can be sold and added to the network. The projects of the Carbon Finance Unit are important in dealing with this issue. Removing animals from the yard would have a positive effect on water quality in the shallow wells<sup>113</sup>. What could be a barrier in collecting the animals in one place is the people's resentment to collectivism due to their history. It will also

<sup>112</sup> REAW, meeting 2009-11-06

<sup>113</sup> Hugosson, Larnholt, 2010

enlarge the distance between people and animals in the direction of the situation in Western Europe. Large scale animal keeping is a setting that more easily might violate animal rights and similar problems.

At the biogas installation in Vodo lui Voda there is a possibility to construct a local heating system, a network, to heat schools, kindergartens, official buildings and so on. The installation still works but is locked and not used at the moment. A feasibility study is needed. The question is if this centralized system would be more expensive than the use of wood. In that case the successfulness is doubtful.



FIGURE 51: TURKEY IN A GARDEN IN LOZOVA. PHOTO BY ANNELIE KJELLBERG

Garbage is a big problem in Moldova but should be seen as a resource. If the ongoing project on waste incineration fails there is still good potential for a plant a bit smaller in size. If there is considerable information and discussions with the public they will also start sorting the garbage for recycling.

Sludge is also biomass. There is a biogas recovery installation in the Chisinau sewage treatment plant but it is not in use. There is current-

ly a huge project planned to modernize the entire plant so there is lots of potential to make use of this material for energy production. Moldova is very much in need of building sewage systems all across the country.

### SUN, WIND AND WATER

Moldova has a lot of sun. This is an unused potential. The biggest potential lies in thermal sun panels. They are cheaper and more efficient than Photo Voltaic (PV) cells. One example of a suitable usage of PV cells is street lighting in the villages. Several people involved in the society in different villages have expressed this as a priority.

The potential for wind and water is relatively low. But still there are opportunities in both fields and it can be used to complement other sources of RE. It is important to have a diversified energy production for security and because

of the dependency on external factors of weather and climate. Regarding hydro power the existing small scale installations from the Soviet time constitutes a potential. They are lying in the landscape waiting to be in use again. What they basically need is new turbines.



FIGURE 53: SUNPANEL. PHOTO TAKEN IN SWEDEN BY ANNELIE KJELLBERG



FIGURE 52: WIND POWER. PHOTO TAKEN IN SWEDEN BY JONAS SNÄLL



FIGURE 54: FRAGMENTS OF FIGURES TAKEN FROM THE MASTER THESIS OF MARIN CERNEA(CERNEA, 2008).

## THE LANDSCAPE

### LAND CONSOLIDATION

To solve the situation with the extensively fragmented landscape of small scattered agricultural fields some amount of consolidation should be considered. Land consolidation is juridical and technical measures that are taken to optimize the physical condition of the plots regarding size, layout, and shape and also to set up systems for the prevention of further soil erosion and to improve the soil function<sup>114</sup>. The aim is to create favorable conditions for economic activities of private farmers, agricultural enterprises and collective farming based on private ownership of land.

The increasing economic gap between urban and non-urban areas is what has made the government recently intervene to start land

consolidation. Land consolidation could be either individual, through land market mechanisms, or formal, through state instruments. Making individual land consolidation difficult are high transaction costs, landowners absenteeism, complex inheritance procedure, limitations to the possibility for foreigners to buy land and in some cases emotional attachment.<sup>115</sup>

Models developed for formal methods are focused on large scale buyers, redistribution of land or massive amalgamation. An advantage with formal methods is that projects focused on the erosion are prioritized. Amalgamation, creating large collective farms was elaborated by the planning institute of Moldova. It might be the most viable type but there are no solutions for registration of such large land areas owned by large scale enterprises with so many

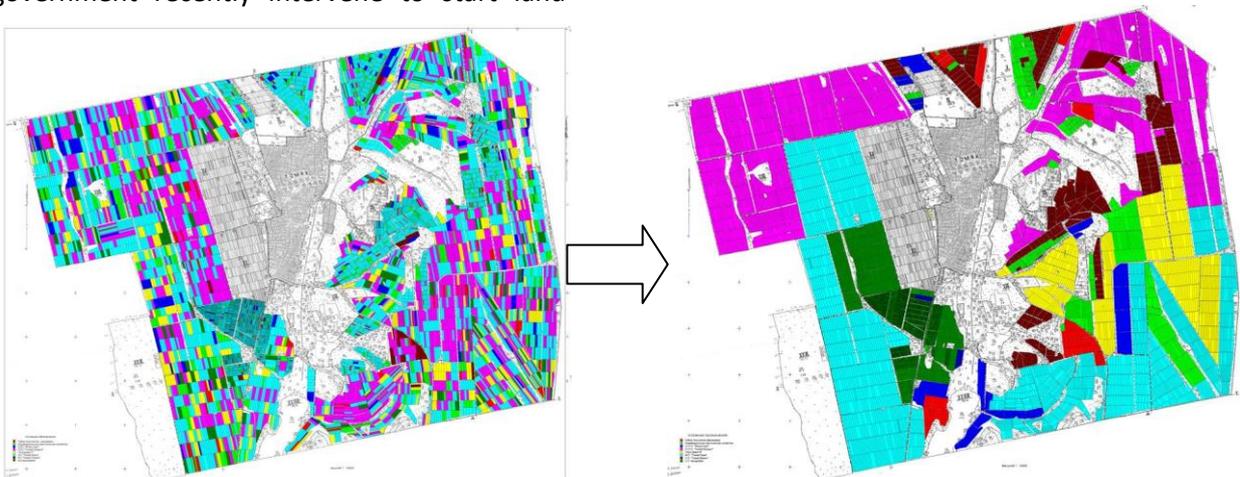


FIGURE 55: FIGURES TAKEN FROM THE MASTER THESIS OF MARIN CERNEA (CERNEA, 2008).

<sup>114</sup>Cernea, 2008

<sup>115</sup>Cernea, 2008

shareholders. This type would also be most suitable in the south part of the country where there is more arable land and fewer vineyards.

There is a low interest from landowners to optimize or enlarge their landholdings. According to Marin Cernea at Ingeocad in Moldova this is due to lack of awareness.<sup>116</sup>

This transition that the Moldovan landscape faces will have enormous consequences. Regarding renewable energy this could make it more practically easy to bale and collect straw for bio energy. It would probably also facilitate centralized establishment of wind farms for energy production due to a simplified process with less people involved, if this is less democratic or not is another question.

#### REFORESTATION

If the RE technologies would have a vast implementation in the villages it could have an impact on the current deforestation. Alleviating the large pressure on the forest and single trees from firewood harvesting would create a setting for a more woody landscape. This could also have consequences on the ecological issues connected with this question such as landslides and erosion. These issues could improve and biodiversity increase together with the reparation of more diverse ecosystems.



FIGURE 57: POLLARDED TREES IN LOZOVA. PHOTO BY ANNELIE KJELLBERG

Another way of dealing with the deforestation is using pollarding more frequently. This is encouraged by J-O Helldin, researcher in ecology at the Swedish Biodiversity Centre (CBM)<sup>117</sup>. Pollarding could be used for producing heat in the biomass boilers. Pollarding is a traditional



FIGURE 56: THE CODRII RESERVE. PHOTO TAKEN BY CAISIN VALERIU

<sup>116</sup> Cernea, 2008

<sup>117</sup> Helldin, talk 2009-10-09

way of harvesting fodder for animals and would look beautiful in the cultural landscape. Large quantities of biomass could be removed without leaving the soil barren. The roots hold the soil and different field layers could enhance the ecosystems. It would be continuous ecosystems that would benefit both flora and fauna.

#### LIVELY LANDSCAPE

The countryside in Moldova is despite the huge urbanization and migration highly populated. All households have fields where they grow food for their own consumption. This makes the landscape lively.

Technologies like biomass burning in effective installations promote the activities in the agricultural landscape. The lively landscape in Moldova is a quality with a great value and these technologies could generate a continuation of this landscape.

Land consolidation could both be positive or negative concerning the lively landscape. It would enhance the possibilities for agrobusiness to become profitable. The poverty could be reduced and less people would be forced to migrate abroad or to the cities for work. The consolidation will also promote large scale monocultures where machines replace a lot of workforce. This could depopulate the countryside since the agricultural land would only occupy a small fraction of the people that

are involved in agriculture today.

#### THE EUROPEAN LANDSCAPE CONVENTION

Moldova has ratified the European Landscape Convention (ELC) and it entered into force in Moldova in the year 2004<sup>118</sup>. The aims of this Convention are to promote landscape protection, management and planning, and to organize European cooperation on landscape issues. One of the statements of the convention is that the members should show concern to achieve sustainable development based on a balanced and harmonious relationship between social needs, economic activity and the environment. The landscape contributes to the foundation of local identity.<sup>119</sup>

Definition of landscape for the purpose of the convention: "Landscape' means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors"<sup>120</sup>.

The members that have signed the ELC need to raise awareness and promote education of specialists. They need to promote courses at schools and universities to address subjects relevant to the protection, management, and planning of landscapes. Moldova has also through signing the convention undertaken to identify their landscapes, and to analyze characteristics and forces transforming the landscape in order to introduce instruments to real-



FIGURE 58: LANDSCAPE NEAR LOZOVA. AVAILABLE AT [HTTP://COMMONS.WIKIMEDIA.ORG](http://commons.wikimedia.org), 2010-04-26

<sup>118</sup> Council of Europe, 2010-04-24

<sup>119</sup> Council of Europe, 2000

<sup>120</sup> Council of Europe, 2000

ize the aim of the convention.

The participation of the population concerned in the formulation and implementations of policies is an important feature of the convention. The landscape is important for the social well-being. It is an issue that affects the whole population and requires collaboration between a wide range of organizations and individuals. The convention can therefore be a tool to increase democracy. This convention needs to be part of an implementation of RE where landscape is affected.

## THE NATIONAL LEVEL

### ENERGY SECURITY

Nationally it is very important to have energy security. This is also stated in the energy strategy of Moldova to the year 2020 approved the year 2007<sup>121</sup>.

There should be more than one source. It is important to import from several different countries. This is also something they are working on. A harbor at the extremely small strip of shore at the Danube River at the south west corner of Moldova makes it possible to get oil from the Middle East. Now Russia, Romania and the Middle East are available for import.

This is an important complement to producing energy within the country. Domestic energy production should be a considerable part of the total energy balance. The future of fossil fuels is uncertain. Peak oil refers to the debate on when production of oil will reach its peak. Production of oil will then no longer be able to meet the strong demand. Fredrik Robelius predicted 2007 in his dissertation "Giant Oil Fields – the Highway to Oil" that it will occur sometime between 2008 and 2018<sup>122</sup>. This is including oil supplies very hard to reach and unusually environmentally hazardous. Other fossil fuels

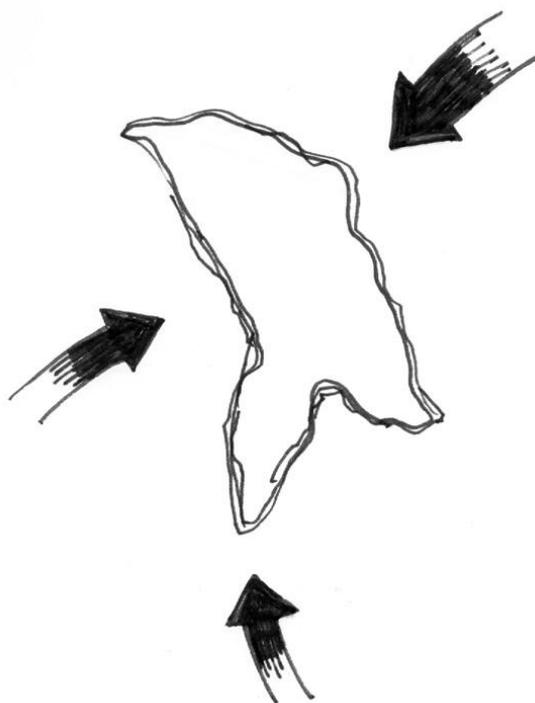


FIGURE 59: ENERGY IMPORTS FROM THREE SOURCES. DRAWING BY ANNELIE KJELLBERG

are also running low and prices are increasing. Considering the increased prices it is beneficial to invest in renewable energy. It will not run out even if some parts of the installations needs to be replaced at times and service is needed.

Politically it would definitely be to the country's favor if they could elect a president and create some kind of stability in the political sphere. This is required for a good climate for investment. The situation with Transnistria needs to be solved. They are very much aware of this and become more and more keen on this while aiming for an EU membership. Since Moldova became a neighboring country to the EU when Romania joined in 2007, Moldova approved on a plan of action within the framework of the European Neighborhood Policy (ENP). They put big political importance in fulfilling the plan<sup>123</sup>. Another key factor is fighting and decreasing the corruption.

<sup>121</sup> Ministry of Industry and Infrastructure, 2007

<sup>122</sup> Robelius, 2007

<sup>123</sup> Sida, 2007

It is important to develop mechanisms and national strategies for promoting RES in Moldova. The legislation should also be improved.

#### DECENTRALIZATION AND DEMOCRACY

The Soviet Union was centralized in all respects of function, control and financing. Today, Moldova has regional and local bodies, the local primarias not having a bigger population than around 5000 in average. They have now a lot of functions but suffer from a shortage of resources to carry out these functions. In the municipality of Chisinau this is also a problem. Private interests get a lot of power through their financial resources.

#### SOLVING THE SITUATION FOR THE SINGLE HOUSEHOLD

The implementation of RE has many levels.

There are the national and local government levels but for me it has been important to understand the situation for the single household. Reforms should in my mind be for the benefit of the average person in Moldova so I have looked into their perspective.

For a vast implementation of installations for private houses I would recommend special types of leasing. If the national situation in the country would stabilize, it would be much easier to take loans but considering the Moldovan mentality I think leasing would work better. It would be appropriate considering the short term planning needed and relatively low risk.

People are focused on providing for themselves and why not work with this. Give them the possibility to produce their own energy with installations appropriate for the private household. This could be thermal sun panels to produce



FIGURE 60: MAN IN ANTONESTI WITH A BIOMASS BURNER HE BUILT INSPIRED BY THE REAW PROJECT. PHOTO BY ANNELIE KJELLBERG

heating and hot water. Biomass burners could be installed for a neighborhood or smaller burners could be developed to fit one household.

Shallow geothermal energy would be hard to implement as the plots around the houses are too small. Every inch is used for vegetables, grapes or animals. It would not be possible to keep this up with shallow geothermal tubes in the ground.

Something that would make a huge difference is insulation. Houses need insulation. They would also need double glass windows more commonly used.

In the apartments in the cities insulation is also important. Apartments are today leaking considerable amounts of heat. An obvious change that needs to be done in the apartments is also installing thermostats in every apartment. Central heating is today either on or off in the cities. In the winter it is sometimes so hot that people keep their windows open. Enormous amounts of energy could be saved.

## KEYS TO IMPLEMENTATION

For the people to make changes concerning energy in their household and in society they need to see with their own eyes that renewable energy technologies work and how they work. Demonstration projects are very important. It has earlier proven to work. Corneliu Bordeianu, project manager at the REAW project, says that they through demonstration projects managed to show that their technology was good for Moldova and effective. They revealed both economical and social benefits. At first people saw biomass burning as something of the past, only gas was modern in their view. They had to demonstrate that it was a new technology and

the result is that further boilers have been installed by private investors.<sup>124</sup>

No matter if private installations or large scale installations are being built and established, the population needs to be consulted. It is important to continually discuss with the people. Even if Moldova is a country with a large power distance the need for public participation has been mentioned by many people in my interviews.

There are some keys to use in order to convince the people. The energy technology needs to be effective, cheap and convenient. This also needs to be mediated to the public.

The aspect of effectiveness is important to communicate that the technology is modern. Effectiveness is important for the sustainable use of resources and costs.

The economic resources in Moldova are very small, and for the private household even more so. Their minimal salaries are today eaten by bills in a, with Swedish standards, unrealistic proportion. Heating a house with gas costs half of a mayor's salary per month<sup>125</sup>. Intensive investments are hard since they do not have much saved and are unable to take loans. For local governments and companies it is also very



Effective  
Inexpensive  
Comfortable

<sup>124</sup> REAW, meeting 2009-11-06

<sup>125</sup> Antonesti, meeting 2009-12-03

hard to handle intensive investments. So therefore the technology needs to be cheap.

Moldovans are today struggling with time consuming practices like heating their houses with wood. They collect and cut the wood, start up the fire and keep it going the whole day during the winters. Wood and coal are also dirty to work with. They see it as a strong improvement of their living standard if the source of energy for heating is easy to use, not time consuming and do not demand dirty work. In this way it needs to be convenient and comfortable to use.

Introducing new, better technology it is important to start with the public institutions, especially schools and kindergartens but also the primaria. The community is important and these buildings are prioritized. This will also make the technology visible and accessible and work as a demonstration. If something can be to the benefit of children's health it is prioritized.

Generally it can be concluded that it is important to work with awareness. Knowledge about RE should be communicated to the common citizen.

## THE FUTURE

I think that, whether they are aware of it or not, the domestic energy provision will change a lot in the near future. It is already too expensive and it will become unbearable to continue as they do. There have been too little service of the installations since the economic recession and large parts will have to be replaced. Both these aspects are both providing the incentives needed for a radical change in the system.

We are also facing a shift in generations. The older generation has been formed during the period of the Soviet Union and carries a lot of support for central governing. Now it is almost 20 years since they became independent. The

new generation can think new and dare to find new solutions.

Three years ago there was hardly any internet in Moldova, now everyone has it. There is free internet in the central park and at the airport. I think we could expect a similarly fast development in renewable energy if the decision is made.

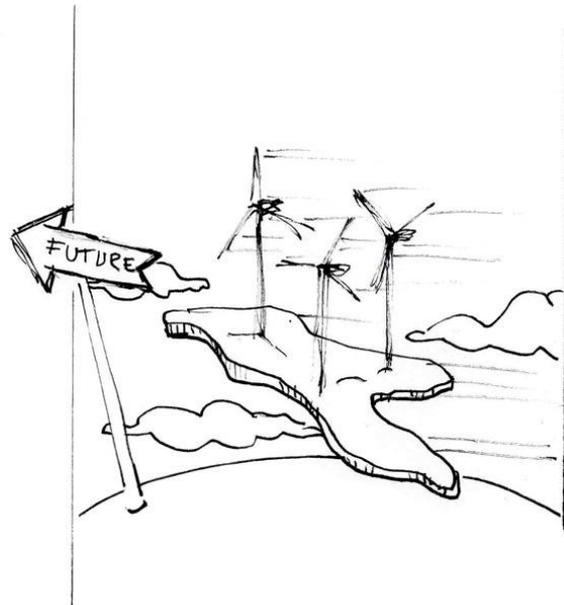


FIGURE 61: RENEWABLE ENERGIES PROPELLETRING MOLDOVA INTO THE FUTURE. DRAWING BY ANNELIE KJELLBERG





## LOZOVA – AN EXAMPLE

The purpose of this chapter is to concretize the more general discussion in the previous chapter. In my study I have worked specifically with Lozova, focusing my interviews with local population in this village. A lot of the material will be a repetition of earlier chapters but it is needed to give the full case. This chapter can also work as a more practical compilation to be used by the population of Lozova, a way for me to return some of the generosity they have showed me.

Lozova is situated about one hour from central Chisinau with public transportation (see the map on page 21). The area has relatively much forest but less cattle than other parts of the country. It is quite a big village with around 7000 inhabitants. Important issues in Lozova are water quality, deforestation and the expensive gas being the only alternative to wood and coal.

The most important potential lies in biomass as in the rest of Moldova. Straw should be used in new effective biomass boilers. The knowledge from the REAW project should be used. Capmu, leading the REAW project in Moldova should be contacted to begin cooperation.

The technique of pollarding is very suitable for Lozova. They are in a forested area and the recent deforestation in the area could be compensated partly by planting trees for pollarding in designated places. This material is good to use in combination with straw in the biomass boilers.

FIGURE 62 (OPPOSITE PAGE): STREET IN LOZOVA. PHOTO BY ANNELIE KJELLBERG



FIGURE 63: ANATOL SIRBU DISPLAYING A BALE OF STRAW. PHOTO TAKEN IN ANTONESTI BY ANNELIE KJELLBERG



FIGURE 64: PV CELLS. PHOTO TAKEN IN SWEDEN BY ANNELIE KJELLBERG

The solar energy potential in Lozova is around 1500 kWh/m<sup>2</sup> <sup>126</sup>. Putting PV cell powered streetlights in the main street would be a good and concise project. The proposal of this

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<sup>126</sup> ESTI, 2010-04-26

project is expressed by the mayor. It could make the citizens more proud of their village.

It would be a good idea to promote the implementation of solar panels on roofs of the public buildings as well as private houses. This could be managed by private companies. The companies might need an incubator to start up the business. It would be a good idea to let the people lease the systems. This would minimize the risks for the renting household.

60 years ago there were plenty of windmills on the hill called the Hill of Mills. This hill is now covered with houses. The history of windmills in Lozova makes the population very positive to wind energy. A new location with favorable wind conditions should be found to put up turbines. If this energy is connected directly to power the buildings in Lozova it would be simple for the villagers to appreciate the installation. They would be very happy to have this<sup>127</sup>.

The large dump of garbage in Lozova is a resource to create energy. Waste incineration is something that would be more efficient when applied more centralized. The short distance to Chisinau makes it practical to send the waste to be incinerated in a plant in Chisinau. There should be elaborated a system of collecting garbage for transportation to Chisinau.

The outdoor toilets in Lozova are a big problem. Lozova has a shortage of water and especially potable water. This is one of the biggest concerns of the Mayor Maria Ursachi. According to the study of Hugosson and Larnholt the main source of pollution of the water in Moldova is the outdoor toilets<sup>128</sup>. Their suggestion is to install Ecosan toilets. The urine and faeces are separated in different containers. The urine could be diluted and used immediately to fertilize the crops in the garden or in the fields. The faeces are treated and sanitized. Ecosan would

be a sustainable solution to the issue of sewage. There is no sewage system today. The Ecosan toilets should be accompanied with considerable information campaigns. If the people still insist on water closet toilets a sewage system needs to be built.

There is a wonderful possibility to start up a demonstration project for the promotion of sun panels and biomass boilers powered on straw and material from pollarding. The school in central Lozova is a perfect place for demonstration. It should be insulated and the windows replaced with insulated windows. Sun panels could be put on the roof and biomass boiler installed to supply thermal power to the building. The demo project could be included in the education. This raises awareness in the new generation. The parents visiting the school would naturally get information about the technology. The children will also bring the information home through for example discussions at the dinner table.



FIGURE 65: A SCHOOL IN LOZOVA. PHOTO BY ANNELIE KJELLBERG

As in general the technologies to implement locally in Lozova should have high efficiency, be cheap and convenient. New installations should be discussed with the population concerned.

To work within the cultural dimensions in Lozova, it is needed to accept the hierarchical system. If installing bigger installations than for one or a few households the mayor needs to take part and make the decisions. It might be

<sup>127</sup> Lozova, interviews 2009-11-26 – 2009-12-17

<sup>128</sup> Hugosson, Larnholt, 2010

easier to promote big changes coming from outside as the person would not be as dependent on the hierarchy and social system. For an installation to be successful though it is important to have trust from the population. The human relations are important to gain trust and conflicts need to be handled correctly within the norms of the society.

Lozova has many advantages to implement RE technologies. The short distance to Chisinau makes it easier for specialists to come and companies in Chisinau could expand their work to Lozova regarding solar or bio energy. Garbage could more easily be transported. The forest is a big quality both for the wellbeing of the population and for the biomass potential. The population is very positive to RE technologies. They need and want a change.



## FINAL CONCLUSIONS

Living and working in Moldova has been a pleasure. They are a wonderful people. They are now in a period of transition. A lot is happening in the society and in the landscape. This is a golden opportunity to implement a new sustainable system for energy supply. Renewable energy would promote a socially, economically and environmentally sustainable society if implemented in a good way. The cultural dimensions in Moldova need to be respected and the existing resources used responsibly. The biggest potential in RE in Moldova lies in biomass: straw, other agricultural residues and pollarding. Solar energy also has a large potential. Technologies implemented need to be effective, inexpensive and comfortable. Renewable energy within the nation is needed to create a security in the energy sector. 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.



## REFLECTIONS

### PERSONAL REFLECTIONS

Coming to Moldova from abroad it is hard to see the poverty. People in the city dress nice and posh and a lot of big, expensive cars are seen in the streets. They are a proud people and they do not want others to pity them. In the streets there are almost no beggars and in the markets you are treated as everyone else even though they notice you are from Western Europe. Coming home to a Moldovan family they show great hospitality, with lots of food and wine and gifts when you leave. It is easy to adopt the picture of poverty that is transmitted



FIGURE 67: CONSERVED FOOD. PHOTO BY ANNELIE KJELLBERG

FIGURE 66 (OPPOSITE PAGE): DRAWING BY ANNELIE KJELLBERG

from media. This picture is not coherent to the poverty in Moldova. The poverty in Moldova means there are very few jobs, extremely low salaries, enormous migration and many children without parents, having very difficult lives. Infrastructure is also very bad. But they do have food, they are skilled in food conservation, they have some clothes and most can heat at least a small house. The people seen with posh clothes in the city are part of the small elite or as in most cases, they have money from abroad.

During the Soviet time they were always told that they were rich and wealthy. When the wall fell they saw their relative poverty. One woman I met said she is very happy and content about her life when she is not thinking about how people live in the west, but unhappy when she does.

There are many values in Moldova that are lost in Scandinavia. Two female teachers I interviewed talked about the strong family bonds and how the spirit is lost in those people that come back from abroad. They say they are less caring about people in need. This is a consequence of individualism. But there are advantages with an individualistic society too. It is different but both good and bad.

Moldova is situated between Romania and Ukraine. Romania was not part of the Soviet Union but there is a large county in Romania called Moldavia that Moldova belonged to in the past. Many Moldovans consider Romanians their brothers and sisters and the other way around. There is sometimes though an arrogance from Romanians meeting Moldovans or migrated Moldovans returning to Moldova. Maybe the Romanians are proud to be in the EU and ashamed of the fact that they earlier were in a situation similar to Moldova. I have a feeling also some migrated Moldovans are somehow ashamed of the situation in Moldova. I think this is unnecessary. Moldova is a wonderful country with lovely people. It is a place

to be proud of. I love Moldova and its people and hope to go back soon.

## REFLECTIONS ON METHOD

My method has been to search for a method. I have therefore constantly reflected on my method in order to improve it during the process. I have aimed to grasp the holistic view exploring the socio-technical complexity of the subject. This method has led to more breadth than depth in this study. This has given me an important flexibility to be able to adjust to the circumstances that my study has aimed to explore. I think this has been very important in order to be effective in collecting the kind of information I was looking for and analyzing it.

Even though I didn't feel prepared enough when I went to Moldova I still think it would have been more efficient use of time to have left earlier. You can never be prepared enough and still everything turns upside down when you experience the country. I didn't leave earlier due to scholarship applications.

I would have preferred to work together with a second student. It would have been valuable to discuss experiences and interviews with a fellow student comparing with our earlier experiences. Also making decisions and discussing the report would have benefitted the results. At the same time it was a freedom to work alone and to find the people to cooperate with in collecting and analyzing the information.

The broad focus of this thesis needs to be discussed. It could be argued that I should have had a more narrow focus. It could have been more appropriate considering the scope of a master thesis of 30hp (one semester). Considering the lack of earlier studies, with the landscape planning perspective in this subject in languages that I understand, this was however very appropriate. I see the landscape planner as a person who works with a holistic approach. Before we can go into depth we need to grasp

the big picture and this is where I hope I can contribute with this thesis.

It has been good to work mainly with interviews when collecting information. It has been effective and has helped me to understand the Moldovan culture. It is also a method that motivates me. At the same time it was important to combine this with written papers, articles and other texts in order to analyze the interviews better and to compare information.

My fieldtrips helped me to understand the difference between local circumstances and national. I met local people during all my visits in all parts of the country and discussed the subject with them.

More literature for background theory would have been an advantage. But within the time-frame of the thesis, I had to focus on interviews and collecting information about Moldova concerning the subject. Further research could continue processing the information, analyzing it with more theoretical depth.

## ABOUT GETTING INFORMATION IN MOLDOVA

Performing this study I have had lots of experience of the Moldovan mentality. Their short term planning has made it easy for me to book meetings on short notice. When working in this culture it is also important to be flexible.

Something that has made it more difficult for me to collect information is their lack of interest for failed projects. They do not want to talk about failed projects and they have not analyzed why they failed.

Talking to the rural population they were sometimes intimidated by the subject. They were afraid they had nothing to contribute with. This affected the interviews.

Getting literature about the subject of the study in the Moldovan context has been difficult. Most documents are written in Romanian

or sometimes in Russian. The amount of written information available for me has therefore been limited. The method of performing interviews has therefore been an effective way of gaining information.

#### WORKING WITH A TRANSLATOR

Without adequate knowledge in Romanian or Russian it has been inevitable to work with a translator. My translator cooperated with me during most of my interviews and he also became a good friend. Some things are always lost in translation and some things are gained.

Having second hand information, even if it is communicated directly, some information is lost. Details but especially values are lost and these things are important in a qualitative interview. The mood of the translator also affects the interview. When I have an interview it is important for me to gain trust and create a relaxed atmosphere. I want to build up a good dialog, showing my interest and that I value their answers. Using a translator this is much harder as the translator affects the situation with his/her energy, mood and interest in the aspect of the subject.

My translator was an engineer working at the technical university in Chisinau. This made him very qualified to communicate technical subjects. It was harder to communicate social subjects.

A local translator can also work as a cultural translator. He/she can translate my questions to work in the cultural and social setting. The translator can also culturally translate the answers and explain the context of the answers. This has been very valuable in this study.

#### RECORDING INTERVIEWS

I recorded my interviews on a Dictaphone. This has had both positive and negative consequences. It took a very long time to transcribe the meeting. It was good to be able to listen to the interviews again to catch details or nuances

that I missed the first time. It was also good to be able to direct all attention to the conversation.



## BIBLIOGRAPHY

### PUBLISHED SOURCES

CAPMU Consolidated Agricultural Projects Management Unit. (2008). *Republic of Moldova, REAW Project, Final Report*. Chisinau

Cernea, M. (2008). *The consolidation after privatization of agricultural land in Moldova*. KTH Stockholm

Climate Change Office, Min. of Environment (2008). *Republic of Moldova [Energy Profile]*. Chisinau

Council of Europe (2000). *European Landscape Convention*. Florence

Gillham, B. (2008). *Forskningsintervjun, tekniker och genomförande*. Studentlitteratur, Malmö. Original titel: *Research Interviewing: The range of Techniques*.

Hofstede, G. (1983). *Cultural Dimensions in Management and Planning*. Geneva

Hugosson, H, Larnholt, K. (2010). *Water quality and sanitation in rural moldova*. Uppsala University

Min of environment, UNDP (2002). *Renewable Energy Feasability study*. Chisinau

Min. of Environment, UNDP (2002). *Technology Needs Assessment and Development Priorities*. Chisinau

Ministry of Industry and Infrastructure (2007). *Energy Strategy of the Republic of Moldova to the year 2020*. Approved by Government decision 2007

Moldsilva (2006). *Reserve Codrii*. Chisinau

Pickvance, C G. (1997). Decentralization and democracy in Eastern Europe: a sceptical approach, *Environment and Planning C: Government and Policy* **15**(2) 129 – 142

Republic of Moldova, Ministry of Environment and Territorial Development (2000). *First National Communication of the republic of Moldova under the United Nations Framework Convention on Climate Change*. Chisinau

Robelius, F (2007). *Giant Oil Fields – The highway to oil, Giant oil Fields and their importance for future oil production*. Uppsala University

Ryen, A (2004). *Kvalitativ Intervju, från vetenskap till fältstudier*. Malmö

Sida , *Samarbetsstrategi för utvecklingssamarbetet med Moldavien*, januari 2007 – december 2010, government decision 2007-03-08

Statistica Moldovai (2008). *Statistical yearbook of the Republic of Moldova*. Chisinau

The World Bank (2008). *Moldova national water supply and sanitation project*, The World Bank, Report No: 42300-MD.

UNFCCC, CDM Executive board (2005). *Moldova Biomass Heating in Rural Communities Project, Project Design Document No. 1*. UNFCCC

## INTERNET SOURCES

Council of Europe, Homepage. [online] Available from: <http://conventions.coe.int> [2010-04-24]

Euronews (2009-06-12), Interview - Moldovan activist Natalia Morari [Video], Available from <http://www.euronews.net> [2010-04-24]

Index Mundi. Homepage. [online], Available from <http://www.indexmundi.com> [2010-01-13]

International Energy Agency. Homepage. [online] Available from: <http://www.iea.org> [2009-10-16]

Moldova.org. Homepage. [online] Available from: [www.moldova.org](http://www.moldova.org) [2009-09-02]

Republic of Moldova. Homepage. [online] Available from: [www.moldova.md](http://www.moldova.md) [2009-09-02]

Stamate, O. (2009-08-06), Europas fattigaste klarar krisen bäst. *Expressen* [online]. Available from: [www.expressen.se](http://www.expressen.se) [2010-04-24]

Transparency international. Homepage. [online] Available from: [www.transparency.org](http://www.transparency.org) [2009-09-02]

Visitpmr.com. Homepage. [online] Available from: [www.visitpmr.com](http://www.visitpmr.com) [2009-09-02]

## ORAL SOURCES

### LOZOVA, STRASENI DISTRICT

Gheorghe Chicu, age 57, without higher education and unemployed, translator: Rodica, interview 2009-12-17

Gheorghe Lozovanu, age 24, working with growing strawberries, Ongoing 5 years studies at University of Agriculture, Faculty of Horticulture, interview 2009-11-26

Maria Ursachi, age 55, Mayor of Lozova, has a bachelor's degree in history, interview 2009-11-26

Marila, age 70, without higher education, interview 2009-11-27

Nina Nicolaescu, age 43, teacher of psychology for students 8 – 18 years old. 5 years higher education, second deductive grade, interview 2009-11-26

Raisa, in her 20ties, unemployed, without higher education, interview 2009-11-27

Rodica Jordan, age 30, teacher in English and Romanian, master degree in pedagogy, interview in English, interview 2009-11-26

Tamara Vornicescu, age 52, vice director of education in Lozova and Director of youth center NGO, 5 years higher education, interview 2009-11-26

Tania Madan, age 53, Matt's host mother. She graduated high school (liceul) in Lozova, and has no higher education than that, interview 2009-11-27

Victoria Mocanu, age 72, former kolchoz boss' wife, without higher education, interview 2009-11-27

Matthew McCaffrey, American Peace Corp. Lozova

Sergio Ongriana, translator, prof. assistant Technical University of Moldova, energy faculty

## OTHER

Antoniesti, Stefan Voda district, meeting 2009-12-03

Anatol Sirbu, Mayor of Antoniesti

Sergio Ongriana, Translator, prof. assistant Technical University of Moldova, energy faculty

Cahul, Cahul district, visit 2009-12-13

Ivan Munteanu, Employee at Accord Travel. Visited him and his family in Cahul.

Comrat, Gagauzia autonomous territorial unit, visit 2009-12-11

Julia Uzun, Employee at Samres. Visited her and her family in Comrat.

Pelinia, Drochia district, meeting 2009-11-11

Constantin Byndyu, NGO Consult Nord Manager

Academy of Sciences of Moldova (ASM), Institute of Power Engineering, meeting 2009-11-05

Vitaly M. Postolati, Director, Dr. of Sc. (Engineering), Academician

Vladimir Berzan, Deputy Director, Dr. of Sc.

Sergiu Robu, responsible for international cooperation

Climate Change Office meeting 2009-11-06 and 2009-12-16

Vasile Scorpan, Manager

Marius Taranu, Senior Consultant

Sergiu Robu, Consultant Expert, translator

Ecosfera, REC Moldova, meeting 2009-11-09

Corneliu Marza, General Manager of Ecosfera

Ina Coseru, REC Moldova

Sergio Ongriana, Translator, Prof.assistant at TUM, energy faculty

Renewable Energy from Agricultural Waste (REAW), meeting 2009-11-06

Cornel Bordeianu, Project manager at REAW

SalvaEco, EcoExpert, meeting 2009-11-12

Rodica Negura, President of the NGO SalvaEco

Radu Bajureanu, President of EcoExpert, env. Law expert

Anna Cornander, Solcity Malmö, meeting 2009-10-26

Björn Kavalcov Halvarsson, Political Advisor to the EU Special Representative for Moldova, meeting 2010-02-07

Blaj Radu, Vice-Director, General Department of Architecture, Urbanism and Lands. Chisinau City Hall, interview 2010-03-26

Helldin, J-O. Researcher and ecologist at the Swedish Biodiversity Centre (CBM), talk at the Eighth Council of Europe meeting of the workshops for the implementation of the European Landscape Convention in Alnarp 2009-10-09

Henrik Gustavsson, Biogas Syd, meeting 2009-10-26

Marin Cernea, Ingeocad, meeting 2009-12-22

Marius Taranu, Senior Consultant at the Climate Change Office, email 2010-01-16

Pavel Gavrilita, Carbon Finance Unit, Ministry of Environment, email 2010-02-05

Ronny Arnberg, Head of international projects at Borlänge Energi, , email 2010-04-27

Valeriu Caisin, Forester at the Codrii reserve, meeting 2009-12-08

## PICTURES

Figure 1-2, 5-8, 10, 13, 21-22, 24-35, 37-51, 53, 57, 59-67: by Annelie Kjellberg

Figure 3-4, 23: <http://commons.wikimedia.org>, Available: 2010-04-26. Edited by Annelie Kjellberg

Figure 9: by Daniel Graan

Figure 11-12, 36, 58: <http://commons.wikimedia.org>, Available: 2010-04-26

Figure 14: European Solar Test Installation (ESTI), Available at <http://re.jrc.ec.europa.eu> 2010-04-26

Figure 15-20, 56: by Valeriu Caisin

Figure 52: by Jonas Snäll

Figure 54-55: Cernea, M. (2008), *The consolidation after privatization of agricultural land in Moldova*, KTH Stockholm