USELF
Ukraine Sustainable Energy Lending Facility

Ukraine Sustainable Energy Lending Facility (USELF)
Strategic Environmental Review
Environmental Topic Paper

23rd September 2011

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CONTENTS

Tables

Figures

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ABBREVIATIONS

AD	Anno Domini
amsl	Above Mean Sea Level
BC	Before Christ
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
ER	Environmental Report
EU	European Union
FEC	Fuel and Energy Complex
FI	Financial Intermediary
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GIS	Geographic Information System
GRP	Gross Regional Product
IFC	International Finance Corporation
ILO	International Labour Organisation
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
MFE	The Ministry of Fuel and Energy of Ukraine
Mm^3	Million cubic metres
MPCs	Maximum Permissible Concentrations
NAER	The National Agency of Ukraine for the Efficient Use of Energy Resources
NERC	The National Electric Energy Regulatory Commission
NGO	Non-Governmental Organisation
NJSC	National Joint Stock Company
OHS	Occupational Health and Safety
OVNS	Assessment of Environmental Impacts (Ukrainian)
PRs	Performance Requirements
PV	Photovoltaic
SCS	State Construction Standard
SEA	Strategic Environmental Assessment
SEP	Stakeholder Engagement Plan
SER	Strategic Environmental Review
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USELF	Ukraine Sustainable Energy Lending Facility
WFD	Water Framework Directive

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USELF STRATEGIC ENVIRONMENTAL REVIEW: ENVIRONMENTAL TOPIC PAPER

1. INTRODUCTION AND PROJECT CONTEXT

1.1 Project Background

To encourage businesses to pursue sustainable energy projects, the European Bank for Reconstruction and Development (EBRD) has launched the Ukraine Sustainable Energy Lending Facility (USELF). USELF aims to '*provide development support and debt finance to renewable energy projects which meet required commercial, technical and environmental standards*'. USELF not only provides tailor-made financing, but also provides technical assistance for businesses and local authorities based on information gathered and analysed by stakeholders to promote projects that are often challenging to finance and implement.

USELF is part of the EBRD's Sustainable Energy Initiative (SEI) which addresses the challenges of climate change and energy efficiency. Since the launch of the SEI in 2006, the EBRD has remained at the forefront in helping countries from Central Europe to Central Asia secure sustainable energy supplies and finance the efficient use of energy that will cut demand and imports, reduce pollution, and mitigate the effects of climate change.

In co-operation with the national authorities in Ukraine, EBRD has commissioned a Strategic Environmental Review (SER) for the USELF programme, focusing on renewable energy technologies in optimal areas of Ukraine. The renewable energy technologies specifically reviewed in this SER include hydropower, on-shore wind, solar, biomass, and biogas technologies. The SER will comply with the EBRD's Environmental and Social Policy and its Public Information Policy.

Figure 1-1 shows the basemap of Ukraine, including the oblasts of which it is formed. The Oblasts of Ukraine (in alphabetical order) are as follows:

- Cherkasy
- Chernihiv
- Chernivtsi
- Crimea
- Dnipropetrovsk
- Donetsk
- Ivano-Frankivsk
- Kharkiv
- Kherson
- Khmelnytskyi
- Kirovohrad
- Kyiv
- L'viv
- Luhansk
- Mykolaiv
- Odessa
- Poltava
- Rivne
- Sumy
- Ternopil
- Vinnytsia
- Volyn
- Zakarpattia
- Zaporizhia
- Zhytomyr

Figure 1-1: Basemap of Ukraine

Ukraine Sustainable Energy Lending Facility Strategic Environmental Review

Basemap

Legend

- City
- National Capital
- Oblasts / Regions
- Airport
- Primary road
- Railroads
- Intermittent stream
- Perennial stream
- Water body

N
W E
S

0 50 100
Kilometers
1 cm = 60 km

USELF
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BLACK & VEATCH
Building a world of difference.

GeneralBasemap J.Steurer 12/22/10

Data source: ESRI

1.2 The Strategic Environmental Review (SER)

The purpose of the SER is to lay out a path by focusing the scope and providing relevant guidance for later environmental reviews of specific renewable energy projects within Ukraine. When specific projects are proposed under USELF, a project level environmental review is required. After the SER, the necessary project level environmental reviews can adapt the mitigation strategies laid out in the SER to the project level.

A Scoping Report was produced in January 2011, and summarised the following:

- The proposed SER process;
- The renewable energy scenarios;
- The SER stakeholder engagement process;
- Other relevant plans, programmes, and environmental protection and enhancement objectives;
- Key environmental conditions and issues; and,
- The next stages in the SER.

The Scoping Report was made publicly available for comment, to ensure that the proposed scope of the SER is acceptable to stakeholders, and to incorporate input to the SER process where applicable.

1.3 SER Topic Paper

This SER Topic Paper provides a more detailed version of the environmental baseline and policy information provided in the Scoping Report. The Topic Paper is also a supporting document to the main SER Environmental Report, and the two documents should be read in conjunction. The Topic Paper provides details on the baseline conditions and relevant policies in Ukraine that need to be fully considered in undertaking the assessment of effects as part of the USELF Renewable Energy Scenarios, including the sensitivity of each environmental receptor to the various renewable energy scenarios. The Topic Paper will be of use to developers when planning and undertaking environmental assessments for projects to be funded by USELF in the future.

Table 1-1 details the structure of the SER Topic Paper:

Table 1-1: Structure of this Topic Paper

Section	Description
1. Introduction and Project Context	Explains the purpose of the USELF SER and Topic Paper
2. Other Relevant Plans, Programmes, and Environmental Protection and Enhancement Objectives	Identifies key legislation applicable to renewable energy and the SER
3. Baseline Data	Summarises the key baseline conditions for each of the key environmental topics considered in an SEA-type report
4. Receptors and Key Environmental Issues	Identifies the environmental receptors that have been identified for this SER under each environmental topic, and summarises the potential issues for each of these in relation to development of the renewable energy scenarios.
5. Sensitivity of Receptors	The sensitivity of each environmental receptor to the various renewable energy scenarios is presented.

2. OTHER RELEVANT PLANS, PROGRAMMES, AND ENVIRONMENTAL PROTECTION AND ENHANCEMENT OBJECTIVES

2.1 Ukraine Legislative Renewable Energy Framework

Note: On December 9, 2010, the President of Ukraine announced significant changes to the organisation and responsibilities of energy-related national agencies and authorities. The information provided below is subject to change based on how the new structure is put in place. However, for most of the purposes of this SER Environmental Topic Paper, the description of pre-existing conditions is still appropriate.

(a) Administrative framework

The Ministry of Fuel and Energy of Ukraine (MFE)

MFE is the central executive authority responsible for managing the electricity generation sector in Ukraine. MFE is the main body within the system of executive power that ensures the implementation of the state policy in the electric energy, nuclear industry, and oil/gas industry sectors. Its mission includes the following:

- Managing the country's fuel and energy sector;
- Ensuring the implementation of the state policy in the fuel and energy sector; and,
- Ensuring the country's energy security

To achieve its mission, MFE conducts the following core functions:

- Participation in drafting the national, sectoral, and local programmes on alternative energy sources and fuels;
- Supervising compliance with the approved electricity and heat consumption regime and technical standards/rules regulating the operation of power generation plants and equipment, electricity networks, and alternative energy facilities connected to the energy grid of Ukraine;
- Preparing electrical energy balances for the energy grid of Ukraine, and balance estimates for natural gas, oil, alternative energy sources and fuels; and,
- Undertaking the monitoring of energy markets.

State Inspectorate for the Supervision of the Electricity and Heat Consumption Regime

The main state authority responsible for the supervision of the electricity and heat consumption regime, technical condition and operation of electrical and heat plants (both generating and consuming), and networks owned/operated by

electric power generation/distribution companies, was previously the State Inspectorate for the Supervision of the Electricity and Heat Consumption Regime (State Inspectorate for Energy Supervision).

This structure was in place in Ukraine until 9 December 2010. When, by the Decree of the President of Ukraine, the Ministry of Fuel and Energy of Ukraine and the Ministry of Coal Industry of Ukraine were reorganised as the Ministry of Energy and Coal Industry of Ukraine.

The energy sector of the Ukraine economy comprises generation companies (companies producing electricity), energy supplying companies, and the companies combining these functions. The sector is under transformation currently and re-distribution of managing and property rights is taking place.

National Joint Stock Company "Energy Company of Ukraine" (NJSC "Energy Company of Ukraine") has the authority to manage the corporate rights of the state in the energy sector. It includes four energy generation companies, fourteen energy supplying companies, and two hydroenergy-generating companies.

National Nuclear Power Generation Company "EnergoAtom" is the operator of all the nuclear power facilities in Ukraine.

State enterprise "National energy company Ukrenergo" has been established to coordinate development and operation of the mains and inter-state electricity grids and provide technological and managerial maintenance of the unified energy system. Ukrenergo manages transmission lines connecting energy generating companies to the energy supply companies and interstate grid.

Each region (oblast) of Ukraine has regional energy generation/supply/distribution agencies (companies), which are called '*OblEnergos'*. *OblEnergos* manage the transmission lines linking directly to the consumers. Up until 2011, *OblEnergos* were run by the state. On February 13, 2011 the Cabinet of Ministers of Ukraine excluded regional *OblEnergos* from the list of the enterprises having strategic importance to the economy and safety of the state; thus allowing their privatisation. The state still keeps the majority of the shares in the *OblEnergos* (for example, in DnieprEnergo 75% belongs to the state with the rest owned by legal entities and individuals). OblEnergos are joint stock companies and are governed by the Law of Ukraine 'On Joint Stock Companies' (2008).

The National Electric Energy Regulatory Commission (NERC)

NERC is the main regulatory body in the electric energy sector. Having 25 territorial branches, NERC is responsible for regulating business entities operating in the gas, oil, and oil product market. NERC is a central executive authority enjoying a special status and is responsible for exercising the following functions

and activities:

- Regulatory functions with respect to natural fuel/energy monopolies and their pricing policies;
- Setting rules that govern core business activities of these monopolies through the application of licensing procedures;
- Taking part in the formulation of a coherent state policy on the development and management of wholesale energy markets;
- Fostering the development of a competitive market environment; and,
- Protecting consumer's rights.

State Agency on Energy Efficiency and Energy Conservation of Ukraine (formerly known as NAER)

The Agency is a central executive authority whose activities are managed and coordinated by the Cabinet of Ministers of Ukraine. The Agency is a specially authorised central executive authority in all matters relating to the implementation of the state energy efficiency and energy saving policy. One of key NAER functions is to ensure an increased proportion of alternative fuels in the energy supply and demand pattern.

Before 9 December 2010, this Agency was known as the National Agency of Ukraine for the Efficient Use of Energy Resources (NAER).

(b) National renewable energy legal framework

The discussion below provides an overview of the main regulatory acts in the field of alternative energy source development, and further focuses on the legal issues related to land management and their implications for the development of alternative energy projects. These issues are regulated by national laws and do not have any specific regional distinctions. In addition, the discussion summarises the analysis of relevant oblast-level plans and programmes, focusing on alternative energy technologies identified in the SER Scoping Report.

Ukrainian national energy legislation consists of a relatively complex and well developed suite of laws and regulations. It is closely intertwined with other sectoral laws and regulations, including environmental legislation (which is briefly reviewed in further sections of this document) and civil law.

The legislative framework of Ukraine that regulates the usage of alternative energy sources includes the following levels:

- Laws of Ukraine that are adopted by the Verkhovna Rada (Parliament) of Ukraine. Verkhovna Rada is the only legislative body in the country. No local legislation in the form of laws exists in Ukraine. Autonomous Republic of Crimea has its own Parliament but it only issues Decrees and Decisions;

- Decrees of the Cabinet of Ministers of Ukraine and of the Cabinet of Ministers of Crimea;
- Acts of the relevant sectoral Ministers, and,
- Regional (oblast) level programs of socio-economic development and sectoral regional programs (e.g., oblast program of energy efficiency).

Presented below is an overview of key regulations that are of relevance to alternative energy activities:

"The Law of Ukraine on the Electric Energy" of 16 October 1997 No. 575/97

Law 575/97 defines the legal, economic and institutional framework for energy sector activities. This Law specifies the list of state supervisory authorities in the electric energy sector; the licensing authority that handles licensing procedures applied to electricity generating, transmission and distribution companies; and also approved the Green Tariff scheme. All wholesale electricity purchases and sales are carried out in the Ukrainian wholesale electricity market. No other wholesale electricity markets are allowed to operate in Ukraine.

In 2008, the Law was amended to incorporate the definition of the Green Tariff. The Law stipulates some guarantees for those electricity generating entities that utilise alternative energy sources. For example, electricity distribution companies are not allowed to deny access to their networks by alternative energy generators.

The Ukrainian wholesale electricity market is required to apply Green Tariffs to the electricity generated by plants using alternative energy sources. Specific Green Tariff rates are set for each entity that uses alternative energy sources to generate electricity; for each type of alternative energy; and for each power generating facility.

The Law of Ukraine "On Alternative Fuels" of 14 January 2000 No. 1391-XIV

Before May 2009, this Law was titled the "Law on Alternative Liquid and Gaseous Fuels" but its scope was later expanded to encompass solid fuels. The Law defines qualifying criteria for alternative fuels and the list of alternative liquid, solid, and gaseous fuels. The Law stipulates the achievement of the alternative fuel usage target of 20% throughout Ukraine by 2020. The eligibility for alternative fuel status is required to be confirmed by the fuel identification document. All biological fuels intended for sale are required to have a relevant certificate.

The Law of Ukraine on Alternative Energy Sources of 20 February 2003 No. 555-IV

This Law provides the legal, economic, environmental, and institutional framework for activities involving the use of alternative energy sources. It defines

such key terms as 'alternative energy sources', 'alternative energy', and 'alternative energy facilities'. It also sets out key provisions of the state policy with regard to alternative energy sources, including the provision that the output and consumption of alternative energy should be increased in a manner that is safe to the environment and human health. Alternative energy facilities are defined as 'power generating and other equipment that generate energy from alternative sources for at least 50% of the plant's total installed capacity'.

The Law of Ukraine "On Amending Certain Laws of Ukraine Relating to the Establishment of Green Tariff" of 25 September 2008 No. 601-V

This Law, apart from amending the Law on Electric Energy by defining the notion of the Green Tariff, also amends the Law on Alternative Energy Sources in the sense that it provides the definition for the term "alternative energy source".

Green Tariff is a specialised tariff applied to the electricity generated by using alternative energy sources (excluding coke oven and blast furnace gases; and for the small scale hydropower plants only). Details on green tariff mechanism are provided in the chapter 2.3 of the present paper.

(c) **National Renewable Energy Policies and Plans**
Ukraine's Energy Strategy for the Period until 2030 (2006)

This strategy includes a statement of the country's energy dependence. As of 2005, the level of dependence was estimated at 54.8% and was characterised by insufficient diversification of energy supply sources, especially oil, natural gas, and nuclear fuel. Ukraine's level of energy intensity per unit of GDP is 2.6 times higher than the world's average. This is mainly attributed to excessive consumption of energy resources per unit of product output, leading to a proportional growth in fuel imports.

The Strategy also includes energy consumption projections showing that energy demand is expected to increase from 176.9 billion kWh in 2005 to 395.1 billion kWh in 2030, an increase of 123% or 218.2 billion kWh. It is anticipated that thermal power plants will continue to remain the main element and foundation of Ukraine's electric energy system up to 2030, though it is planned to gradually phase out excessive thermal power generating capacities.

At present, 7.2 % of the energy generation in Ukraine is from alternative and renewable energy sources (of that, 0.8% is from renewable energy sources). The Strategy identifies the most promising areas for alternative/renewable energy development in Ukraine are with biofuels; extraction and use of coal bed methane; use of secondary energy resources; off-grade fossil fuel deposits; wind and solar energy; thermal energy present in the environment; and economically viable development of hydropower generation capacity associated with small Ukrainian rivers.

The Concept of the State Earmarked Scientific and Technical Programme for Promoting the Production and Use of Biofuels(2009)

While Ukraine imports about 50% of its energy needs (Ukraine Energy Strategy, 2006), the potential level of biofuel usage is 0.8%. The Programme aims to address and reduce the country's economy reliance on energy imports and minimise anthropogenic and technical impacts on the environment. The document outlines four options for reducing Ukraine's energy reliance:

1. Development of coal industry;
2. Development of oil and gas industry;
3. Development of nuclear energy; and,
4. Development of biofuel-based power generation technologies.

Biofuels are considered among the most promising options for alternative energy development in Ukraine, with its potential for economically viable production being estimated at about 24 million tonnes of conventional fuel per year. The Programme's implementation timeframe is 2010-2014.

(d) Renewable Energy Decrees

The Resolution of the Cabinet of Ministers of Ukraine "Issues Relating to the Organisation of Biogas Production and Use" of 12.02.2009 No. 217-r

This Resolution sets out specific actions to be taken by various executive authorities in order to promote the development and use of biogas. Such actions include, among others, analysis of demand for biogas generation/utilisation equipment and organisation of its manufacture at the Ukrainian enterprises. Other required actions include the preparation of changes and amendments to those laws and regulations that govern the permitting procedure for the design and construction of facilities generating alternative fuels and using renewable energy sources.

The Resolution of the Cabinet of Ministers of Ukraine of 19.02.2009 No. 126 "On the Specifics of Connection to the Electricity Grid of Power Plants Generating Electricity from Alternative Energy Sources"

This Resolution specifies organisational and technical arrangements required to facilitate the transmission of electric energy to the local electricity networks from power plants generating electricity from alternative energy sources and having the installed capacity of up to 10 MW.

The sample contract[1] for the connection of a power generation plant to the electricity network is approved by the NERC. The point of connection is defined as the site/property boundary set for a power generation plant or, subject to the site owner consent, part of a site allocated for the installation of such connection. The plant owner is able to sell any surplus energy exceeding internal power needs to the wholesale electricity market or via energy suppliers based on a regulated tariff, or directly to the customers on the basis of contract for the purchase/sale of electricity generated with the use of alternative sources and in accordance with the procedure stipulated by the current legislation.

The NERC Resolution of 22.01.2009 No. 32 "On the Approval of Procedure for Setting, Revising and Abolishing the Green Tariff for Economic Entities"

This Resolution specifies the list of documents required to be submitted as part of the Green Tariff Application. Each submitted application is considered within the period of 30 days and the tariff approval date is set at an open meeting of the Commission. Those companies that use the Green Tariff to sell electricity generated from alternative energy sources report to the NERC on the use of revenues raised through the sale of electricity on a quarterly basis. The Resolution also specifies the terms and conditions for abolishing the Green Tariff.

(e) Future Trends in Renewable Energy Legislation

Recent restructuring of the bodies of executive power demonstrate a trend toward centralisation. Regulatory reform in the energy sector could aim to develop a framework document covering all aspects of energy generation, transmission, and distribution in the country. Ukraine's Energy Strategy (produced in 2006) foresees a possibility to develop a generic legislative act (or a set of acts, in a form of Energy Code) on energy policy that would replace existing laws regulating individual sectors of the fuel and energy complex of Ukraine. However, no draft law in the energy sector is currently registered by Ukraine's Parliament (Verckhovna Rada).

(f) Potential Legal Constraints to Developing/Implementing Renewable Energy Projects

The notion of alternative energy sources is defined in the Law of Ukraine "On Alternative Energy Sources". This refers to renewable energy sources, including solar power, wind power, geothermal power, wave and tidal power, hydropower, biomass, gas derived from organic waste, and wastewater treatment sludge and biogas. It also includes secondary energy resources including blast-furnace and

[1] The NERC Resolution of 16 July 2009 No. 838 "On the Approval of Sample Contracts for Companies Engaged in Energy Generation Activities with the Use of Alternative Energy Sources" sets out a sample contract for connection to the electricity network of power plants generating electricity with the use of alternative energy sources; a sample contract for the purchase/sale of electricity between a customer, a supplier and a company generating electricity from alternative energy sources; and a sample contract for the purchase/sale of electricity between the EnergoRynok (Energy Market) State Company and a power generating company using alternative energy sources.

coking gas, coal bed methane, and recovered surplus process heat.

However, the Law of Ukraine on the Electric Energy in its Article 17-1 only sets the Green Tariff factors or establishes calculation methodologies for those facilities that generate electricity from wind power, biomass and solar power, and companies operating hydropower plants with a capacity of less than 10MW.

Although existing legislation stipulates the use of the Green Tariff for the purchase of electricity generated at facilities using biogas, geothermal energy, wave and tidal power, biomass, organic waste and wastewater treatment sludge derived gas, and excess heat from industrial processes, it does not specify a tariff factor or calculation methodology to be used to set the Green Tariff for these facilities. Therefore, Green Tariffs cannot presently be applied to the biogas and biomass generating facilities described in this SER.

2.2 Regulatory Framework of Land Use Management

According to the Constitution of Ukraine, land is the most valuable asset that enjoys special protection by the state. The right of ownership over land is exclusively acquired and maintained in accordance with the law. The land grant procedure is defined/ governed by regulations adopted by the Verkhovna Rada as the sole legislative body in Ukraine and the Cabinet of Ministers as the country's supreme executive body. The land-use conditions are exclusively defined by relevant Laws of Ukraine.

The Land Code (LC) of Ukraine is the main piece of legislation that governs land relations[2], which specifies, among other things, the land grant procedure for state-owned and communal land. The Law of Ukraine "On the Energy Sector Land and Legal Regime of Special Zones Set for Energy Facilities"[3] includes Section III, which was intended to describe the specifics of land grant procedure for energy facilities, though in practice it mainly contains references to other pieces of legislation or cites them.

The acquisition of land owned by either individuals or legal entities for the purposes of construction of energy facilities is governed by the provisions and conditions set out in the Law of Ukraine "On the Acquisition of Privately Owned Land and Other Property Located on it for Public Needs"[4]. This Law does not distinguish who is implementing the above public needs (be it state or private

[2] Land Code of Ukraine No. 2768-III of 25.10.2001, Vidomosti Verkhovnoi Rady Ukrainy, 2002, No. 3-4, p. 27.

[3] Law of Ukraine "On the Energy Sector Land and Legal Regime of Special Zones Set for Energy Facilities" No. 2480-VI of 9.07.2010, Ofitsiyny Visnyk Ukrainy of 27.08.2010 - 2010, No. 63, p. 9, Article 2184, Document Code 52426/2010

[4] Law of Ukraine "On the Acquisition of Privately Owned Land and Other Property Located on it for Public Needs" No. 1559-VI of 17.11.2009, Ofitsiyny Visnyk Ukrainy of 25.12.2009 - 2009, No. 97, p. 9, Article 3326, Document Code 48789/2009.

business). It should be noted however that according to the above Law, the land will be acquired by the branches of executive power or local self-governing bodies, and only after that the land will be transferred (sold, rented, or other) to the developer (for example, for the purpose of constructing electricity generation plants). Private developers can apply to the authorities with a request to provide the necessary land allotment for development purposes (including energy development projects) and if the authorities provide consent they will accordingly acquire the land allotment.

There is no need to change the land designation prior to land acquisition; this may take place after the land allotment has been purchased. There is also no need to acquire land needed for certain energy-related infrastructure objects, such as transmission lines, transformation substations, or switches and other devices; as these could equally be situated on the land of non-energy-related designations. In such occasions, the land used for energy infrastructure could be used on the basis of rent contracts or permanent or temporary servitude agreements without changes in the type of land designation.

(a) Land Use for Renewable Energy Projects in Ukraine

In order to get approval for development of renewable energy projects, the project site(s) must be compatible with land use and zoning designations. If a project is proposed to be located on lands that are not already categorised and designated for energy use, the landowner must apply for the necessary land use/zoning variances or changes in the zoning designation.

A challenge for new renewable energy development in Ukraine is that the project site must be categorised as “energy land” and its designated use must conform with town-planning and zoning designations before any construction can be authorised.

Renewable energy investors are currently experiencing a serious lack of lands designated for energy purposes in Ukraine; particularly, outside city boundaries where alternative power projects are normally pursued. A further complication is that the majority of lands outside the cities have already been designated for agricultural purposes – which are currently under a land-use change moratorium which will remain in effect until enactment of the laws “On State Land Cadastre” and “On Land Market”, which is not expected until sometime after 1 January 2012.

Ukrainian laws require energy generation projects to be located only on lands categorised for energy use, but do allow establishment of transmission lines across lands designated for other uses. The Land Code of Ukraine sets forth the principle of using land strictly in accordance with its designated purpose. At the same time, Article 14 of Law of Ukraine “On the Energy Sector Land and Legal Regime of Special Zones Set for Energy Facilities” No. 2480- VI dated 9 July 2010 allows location of the energy transmission objects on the lands of any category

without changing the designation of land.

The following summarises the current land use framework and procedure for changing land use designation (re-zoning):

Current Land Use Framework in Ukraine

Classification of land use is designated in two levels – (1) category of land and (2) a specific type of the designated use of a land plot within such category. Land in Ukraine is divided into the following categories:

- lands for agricultural use;
- lands for residential and public use;
- lands for nature reserve and other environmental protection use;
- lands for health-improving use;
- lands for recreational use;
- lands for historical and cultural use;
- forestry fund lands;
- water fund lands; and,
- lands for industrial, transportation, communications, energy, defence and other uses.

Designation of land use is normally indicated in a title document (the state act on the right of ownership to a land plot), a land allocation project, technical documentation or other land survey documentation.

In general there is a lack of correlation between category and designated uses which results in inconsistent and contradictory practices. In some cases, the category of land is indicated in the title documents and land survey documentation, while in other cases a reference is made solely to a specific type of the designated use or to both the category of land and a specific type of the designated use of a land plot.

(b) Change of Land Use Designation

To change the type of the designated use of a land plot, a land owner is often required to apply for the re-approval of the land survey documentation and re-issuance of the title document – however legal practice in this regard is not consistent and is often contradictory.

On 5 November 2009, Article 20 of the Land Code of Ukraine was amended to allow a land owner or user to decide on the particular types of use of its land plot, within the same category of land, provided that use is consistent with town planning and zoning regulations and land survey documentation. However, this freedom does not apply to agricultural lands and lands of defence, which may only be used strictly in accordance with the type of their designated use (hence the moratorium).

On 23 July 2010, the State Committee of Ukraine on Land Resources approved the Classification of Types of Designated Use of Lands by its Order No. 548, which was to take effect on 16 February 2011 and which seeks to establish the correspondence between the categories of land and the types of the designated use of land plots. Energy lands are classified by Order No. 548 into lands designated for (i) location, construction, operation and maintenance of equipment for power generating enterprises, institutions and organisations; (ii) equipment for transmission of electrical and thermal power, and equipment required for the use of power equipment; and (iii) for the purposes indicated in items (i) and (ii) above and for preservation and use of lands of nature reserve fund.

While Order No. 548 provides a more uniform and orderly approach to the designation of a land use, it does not help eliminate practical confusion and ambiguity over the change of the land designation, particularly, when it comes to the changing of a specific type of the designated use of land within the same category of land.

(c) Local Zoning /Land Use Designation Requirements

According to the Law of Ukraine "On Regulation of the Urban Planning Activity" (Regarding Reduction of Permission Procedures in Construction) – adopted by Verkhovna Rada on 13 January 2011 – starting on 1 January 2012, land plots will be allocated for construction purposes only, provided that it is consistent with town planning and zoning designations. Moreover, a change of the designation of a particular land plot will not be allowed if the change is contradictory to the planning and zoning designation.

The Law includes a provision that existing urban planning designations can be modified/updated at the local level by the decision of a relevant local council[5]. The Ukrainian Area Development Master Plan[6] includes provisions for modernisation of existing and construction of new environmentally safe power generation facilities, to be mainly located at the existing nuclear and thermal power plant sites; and development of renewable energy sources in the areas with suitable natural and climatic conditions. This means that these areas should be identified in the first place, appropriately taken into account during the formulation of area development plans and reflected in urban planning documentation. However, it should be noted that in practise, land acquisition and zoning re-designations can be a lengthy process in Ukraine.

(d) Details of Land Grant Procedure for Renewable Energy Projects

The Law of Ukraine "On the Energy Sector Land and Legal Regime of Special Zones

[5] Law of Ukraine "On the Regulation of Urban Planning Activities" (Part 2, Article 16)

[6] Law of Ukraine "On the Ukrainian Area Development Master Plan" No. 3059-III of 07.02.2002, Vidomosti Verkhovnoi Rady Ukrainy of 26.07.2002 - 2002, No. 30, Article 204

Set for Energy Facilities" (Article 14) states that the ownership or use rights (including tenancy rights) over state-owned and communal land can be acquired for energy-related purposes through a decision of a central executive authority or local self-governance body, in accordance with the procedure stipulated by the Land Code of Ukraine. As discussed below (section (e)), the rights can be acquired by legal entities; however the possibility of an individual entrepreneur being able to acquire the land rights is questionable.

According to the Land Code of Ukraine (Part 2, Article 123), an individual willing to acquire the use rights over the state-owned or communal land in order to implement a land development project is required to submit the application for the land development permit to a relevant rural/municipal/rural district/urban district/oblast authority, or to the Cabinet of Ministers of Ukraine, or the Council of Ministers of the Crimean Autonomous Republic, or a relevant oblast/district state administration.

The application should specify the approximate size of requested site and its planned use. The application should be supported by relevant graphic materials reflecting the following details:

- Desired site location;
- Site dimensions; and,
- Written notarised consent of land owner (in case of site acquisition).

A relevant executive or local governance authority, acting within their respective jurisdiction, reviews the application within one month and grants permission for the preparation of land development plan or rejects the application on the basis of a reasoned explanation.

The only legitimate reason for denying an approval to develop a land development plan is the location of a site that does not meet the requirements of:

1. Relevant laws and regulations, development master plans and other urban planning designations;
2. Land management plans and feasibility study documents adopted by relevant regional and local authorities to manage and protect land within their jurisdiction.

Once the approval to develop and land development plan have been granted, the next step is the preparation of preliminary plan for a proposed land development. The terms and conditions for the preliminary planning process are specified in a contract between the Client and Design Consultant, which is normally based on the sample contract form. The sample contract for the preparation of a

preliminary plan for a proposed land development has been approved by the Cabinet of Ministers of Ukraine[7]. The preparation of a preliminary plan for a proposed land development can be undertaken by any individual or legal entity that holds a license to provide land development and planning services[8].

A preliminary plan for proposed land development is submitted for review to the Commission on the issues related to approval of land development applications[9]. The Commission includes representatives of the following bodies: the territorial branch of the State Land Management Committee; Urban Planning and Architecture Authority; territorial branch of the Ministry of Environmental Protection; Sanitary and Epidemiologic Service; and the Cultural Heritage Protection Authority. Where a proposed land development concerns forest land, water-related land, or mineral resource development, the Commission is required to comprise the representatives of territorial branches of the State Committee for Forestry Management, State Committee for Water Resource Management, and State Mining and Industrial Safety Supervision Service. In addition, the Commission may involve the representatives of local governance bodies and agricultural departments of local state administrations. Pursuant to the Regulation governing the Commission's composition and functions, a submission is required to be made by a relevant permitting authority (local council or administration) rather than a project sponsor. After the review of a submission, the Commission may issue any of the following types of resolutions:

- "On the Approval of a Preliminary Plan for Proposed Land Development" (in case of privatisation or grant of use rights over a site in question);
- "On the Approval of Siting of Proposed Development" (in case of land acquisition/purchase for public needs); or,
- "On the Denial of Approval of a Preliminary Plan for Proposed Land Development" (in the event if there are remarks from the Commission members).

The Commission issues its conclusions free of charge and holds its meetings at least once per week. No positive conclusion can be issued if there is an objection of at least one Commission member, in which case the Commission denies the approval. Any member of the commission who objects the approval signs the rejection conclusion with their justification. The rejection could be appealed either in the court, or in the body that is represented by the objecting

[7] Resolution of the Cabinet of Ministers of Ukraine "On the Approval of the Sample Contract for the Preparation of Preliminary Plan for a Proposed Land Development" No. 266 of 04.03.2004, Ofitsiyny Visnyk Ukrainy of 26.03.2004 - 2004, No. 10, p. 127, Article 596, Document Code 28000/2004

[8] Order by the State Land Management Committee "On the Approval of Licensing Conditions for Land Development, Planning and Evaluation Activities" No. 423 of 05.08.2009 Ofitsiyny Visnyk Ukrainy of 14.09.2009 - 2009, No. 68, p. 114, Article 2366

[9] Resolution of the Cabinet of Ministers of Ukraine "Some Issues Associated with the Implementation of Article 186-1 of the Land Code of Ukraine" No. 1420 of 23.12.2009, Ofitsiyny Visnyk Ukrainy of 22.01.2010 - 2010, No. 1, p. 49, Article 13, Document Code 49089/2010

Commission member, or in the higher authority of this body. The appeal shall be processed in 10 days. If the appeal is satisfied, the applicant is provided with the conclusion that approves land development application; simultaneously, an internal investigation is initiated in this case on the Commission member who submitted the rejecting conclusion that does not comply with regulations and laws. Within two weeks after the approval of a preliminary plan for proposed land development or, where the land development documentation is required to go through the mandatory state review procedure – after the successful completion of this procedure, a relevant executive authority or local governance body takes decision on the grant of use rights over proposed land development.

If the grant of use rights over proposed land development falls within the mandate of the Cabinet of Ministers of Ukraine, the approved plan for proposed land development is submitted to local governance administrations (e.g. the Council of Ministers of the Autonomous Republic of Crimea, the state administration in a respective oblast, or Kyiv or Sevastopol City Administrations), which are required to review the application and submit it to the Cabinet of Ministers of Ukraine with their own comments/suggestions within one month term.

If the grant of use rights over proposed land is within the authority of the Verkhovna Rada of the Autonomous Republic of Crimea (ARC), the approved plan for proposed land development is submitted to the Council of Ministers of the ARC, whose responsibility is to review the application and submit it to the Verkhovna Rada of the ARC with its own comments/suggestions within one month term.

A final decision is then made to grant the use rights over proposed land development as defined in the approved plan, which simultaneously approves the preliminary plan for proposed land development; endorses land acquisition and conditions governing the acquisition process (where necessary); grants the use rights over acquired land to the applicant; specifies land use conditions; and approves applicable restrictions and requirements, including (where necessary) a requirement to compensate for loss of agricultural and/or forest land.

(e) Potential Issues

The Law of Ukraine "On the Electric Energy" stipulates equal rights for all enterprises engaged in the generation, transmission and distribution of electric energy regardless of their ownership.

However, in practise, the Land Code of Ukraine may become a serious obstacle for individual private entrepreneurs. Pursuant to Article 65 of the Land Code of Ukraine, land designated for industrial, transport, communication, energy, defence and other uses is defined as land that has been appropriately granted to industries, enterprises and organisations for any of the above mentioned purposes. However, Article 76 of the Land Code of Ukraine also states that the

energy sector land can be held in state, communal and private ownership.

The fact that an individual private entrepreneur does not constitute a legal entity as any enterprise, industry or organisation, creates a serious problem when it comes to the registration of ownership rights over land designated for industrial and energy developments[10] as required under the Chapter 13 "Land Designated for Industrial, Transport, Communications, Energy, Defence and Other Uses" of the Land Code of Ukraine.

2.3 State Incentives for Renewable Energy Projects

The Law of Ukraine “On the Alternative Energy Sources” provides incentives designed to promote the generation and use of energy from renewable sources and a supportive economic climate for the construction of alternative energy facilities.

Currently, the main form of incentive designed to support the development of renewable energy sector is the Green Tariff.

Green tariffs are an important factor in alternative energy investment decision making. Nations seeking to incentivise renewable energy investment, such as European Union countries and Ukraine, have established higher electricity sales prices (and therefore revenues) for alternative energy power compared to traditional fossil fuel-based power. Green tariffs provide higher revenues for renewable energy power projects and assurance of a long-term revenue stream, which allow otherwise less-competitive projects to be more attractive to investors.

The Green Tariff in Ukraine is available to eligible projects until 2030, thus providing long term assurance to organisations that may wish to fund such projects. Projects that come on-line by 2014 will receive the full Green Tariff amount. The Green Tariff is reduced for facilities put into operation (or upgraded) after 2014, 2019 and 2024 by ten, twenty and thirty percent respectively from the 2009 prices. The types of renewable energy projects that are eligible and their associated rates are listed in Table 2-1.

[10] Problems and Issues Encountered in Relation to Land Designated for Industrial and Energy Use. Luhansk Oblast State Department of Land Management - 18/11/2010 http://www.myland.org.ua/index.php?id=2577&lang=uk&razd=

Table 2-1 Minimum Green Tariffs and the latest Green Tariffs[11]

	Minimum Green Tariff (NERC Resolution 857)		Green Tariff for Jan 2010 (NERC Resolution 1591)
Type of Renewable Energy	kopek/kWh (excl VAT)	€ct/kWh	kopek/kWh (excl VAT)*
On-shore wind farms (below 600kW)	70.15	6.46	
On-shore wind farms (above 600kW and below 2 000 kW)	81.84	7.54	
On-shore wind farms (above 2 000 kW)	122.77	11.31	129.71
Power plants on biomass	134.46	12.39	142.07
Solar photovoltaic modules on ground	505.09	46.53	
Solar photovoltaic modules on roofs (above 100kW)	484.05	44.59	
Solar photovoltaic modules on roofs (below 100kW)	463.00	42.65	
Small hydropower facilities (<10 MW)	84.18	7.75	88.94

**** Note:** Green Tariff resolutions issued by NERC are intended to set individual tariffs for each facility qualified for the Green Tariff. As an example, in January 2010, there were three categories of tariffs established – on-shore wind farms above 2 000 kW, small hydropower and biomass generators. All producers within a category get the same tariff, which must not be below the "minimum" tariff fixed by the NERC Resolution 857. The fixed minimum value of the green tariff shall be established by converting the rate of the green tariff into Euro calculated as of 1 January 2009 at the official exchange rate of the National Bank of Ukraine for the stated date.*

Projects utilising biogas from landfill or animal manure do not currently qualify for a Green Tariff, but legislative changes to the Green Tariff criteria are being considered.

The Green Tariff rate will be reduced for facilities commissioned (or upgraded) after 2014, 2019 and 2024 by ten, twenty and thirty percent, respectively, from its current base level. The Green Tariff mechanism has a number of time and economic restrictions:

- The Green Tariff is valid until 1 January 2030;
- From 1 January 2012 onwards, the proportion accounted for by raw materials, supplies, fixed assets, work and services of the Ukrainian origin in the total construction cost of a generating facility producing electricity from renewable energy sources should be at least 30%;
- From 1 January 2014 onwards, this proportion will be raised to at least

[11] Source: EBRD (2010) *Investment in Electricity Production from renewable Energy Sources in Ukraine: Developer's Handbook.* EBRD Pr ID 25329 / 909-489

50%; and,

- As an additional condition for the application of the Green Tariff as an incentive for solar electricity generation, which will become effective from 1 January 2012 onwards, the producers are required to use photovoltaic modules which are composed of raw materials and supplies that are at least 30% of Ukrainian origin.

At the present time, key stakeholders and legislators actively discuss the possibility of postponing the effective date of the condition specifying the proportion of domestically manufactured equipment and services for several years.

In addition, the Tax Code of Ukraine[12] offers tax incentives for renewable energy projects. Tax incentives are summarised in Table 2-2.

Table 2-2 Taxation incentives for renewable energy projects in Ukraine

Type of incentive	Applies to:	Criteria to qualify/limitations (if any)
VAT exemption[13]	Imported renewable energy equipment; energy saving equipment and materials; fuel/energy consumption metering and control instruments; and equipment/materials required to generate energy from renewable sources; materials, equipment and parts used for the manufacture of: a) equipment that uses renewable energy; b) materials, supplies, equipment and parts required to generate energy from renewable sources; c) energy saving equipment, materials and goods whose operation/use ensures reduced consumption and sustainable management of fuel and energy resources; d) metering and control equipment for managing the consumption of fuel and energy resources.	a) the imported goods are intended for self-use by enterprises; and, b) no similar equipment with comparable properties and quality characteristics is manufactured in Ukraine.
Income tax exemption[14]	80% of profits received from sales of self-produced goods in the customs territory of Ukraine, including: • Equipment that uses energy from renewable sources; • Raw materials, supplies, equipment and parts that will be used to generate energy from renewable sources; • Energy efficient equipment, materials and goods whose operation/use ensures reduced	• Valid for 5 years from the moment when an enterprise has generated its first profit as a result of improved energy efficiency; • separate accounting arrangement must be used to report profits and losses from sales of these

[12] Tax Code of Ukraine No. 2755-VI of 02.12.2010, Ofitsiyny Visnyk Ukrainy of 10.12.2010 - 2010, No. 92, Volume 1, p. 9, Article 3248, Document Code 53775/201012

[13] Clause 197.16 of Article 197 of the Tax Code

[14] Clause 158.1 of Article 158 of the Tax Code

Type of incentive	Applies to:	Criteria to qualify/limitations (if any)
	consumption and sustainable management of fuel and energy resources; • Metering and control equipment for managing the consumption of fuel and energy resources; and, • Equipment used for the production of alternative fuels.	goods in the customs territory of Ukraine; • savings achieved through this exemption are to be used to increase production outputs.
Exempt from tax	50% of profits received through the implementation of energy efficiency measures and projects.	• only applies to those entities that are included in the State Register of Enterprises, Industries and Organisations Engaged in the Development, Implementation and Application of Energy Efficiency Projects and Measures; and, • valid for 5 years from the moment when an enterprise has generated its first profit as a result of improved energy efficiency.
75% reduction of standard land tax rate	Land occupied by energy facilities generating electricity from renewable sources[15]	Land located both within and outside the boundaries of urban/rural settlements

2.4 Regional (Oblast) Regulatory Frameworks Related To Alternative Energy Projects

Ukraine has a number of national programmes that aim to support the development of alternative energy sources in Ukraine. At the regional level, relevant programmes exist only in some oblasts. Seven out of 24 oblasts of Ukraine have targeted energy efficiency/renewable programmes (Crimea, Odessa, Donetsk, L'viv, Zakarpattya, Ternopil and Dniepropetrovsk). Some of the programmes are more specific and elaborated than others and the levels of interest and expertise in renewable energy also vary.

[15] The Tax Code of Ukraine uses the term "renewable energy sources" in its narrower meaning than one defined in the Law of Ukraine "On the Alternative Energy Sources". This narrow meaning does not include gas derived from organic waste and wastewater treatment sludge, biogas, recovered heat and off-gases from industrial sources (e.g. blast furnace and coking gas, methane from coal mines, excess heat). These sources are not eligible for exemptions defined in the Tax Code of Ukraine. This example graphically illustrates one of inconsistencies encountered in the current Ukrainian legislation.

In particular, in Autonomous Republic of Crimea (ARC) "The 2010-2014 Energy Saving Programme for the Autonomous Republic of Crimea" provides the list of facilities where solar, wind and small hydro power generation equipment can be installed, and facilities where biogas-fired cogeneration units can be used. It also sets development/utilisation targets for each of the renewable energy sources considered[16]. The 2011-2020 Economic and Social Development Strategy for the Autonomous Republic of Crimea includes a separate section that specifically focuses on the transition toward a more sustainable energy consumption pattern in the Crimea, to be based on the optimised use of local energy sources that can be achieved through the development/utilisation of renewable energy resources (wind, solar, biomass) and alternative fuels (bio-ethanol, biogas, solid biofuel and biodiesel)[17].

The 2011-2014 Odessa Oblast Industrial Development Programme anticipates the development of renewable energy in the region – first and foremost, through the construction and operation of specialised biofuel manufacturing facilities[18]. The 2010-2014 Odessa Oblast Regional Energy Efficiency Programme identifies the following priority areas: the development of alternative energy sources (including the installation of 66 wind turbines with a total capacity of up to 200 MW in the Ovidiopol and Tatarbunar Districts); use of local fuels (the Programme describes a number of pilot projects involving the installation and operation of equipment for manufacturing pellet fuel from straw and grapevine); and use of cogeneration units[19].

The Donetsk regional program contains one of the most elaborated analyses of renewable potential and practical implications. The 2010-2015 Donetsk Oblast Energy Efficiency Programme comprises a section with the analysis of energy efficiency measures implemented in the Donetsk Oblast in 2006-2009. It also identifies the priorities for development and utilisation of alternative/renewable energy sources and provides the list of planned pilot projects aiming to demonstrate the benefits of using recovered energy resources, wind and solar energy, and biomass.

With regard to wind energy, the Programme anticipates the completion of a 120 MW wind power plant in Novoazovsk, and construction of wind farms with a total capacity of 700 MW in the Volodarsk and Pervomaisk Districts. The plans for solar energy development include the construction of a solar photovoltaic plant and

[16] http://minenergy.ark.gov.ua/o-reskomitete/-docs/92-programma-energosberezheniya-v-ar-krym-na-2010-2014-gg.htmlProgramme

[17] http://www.ark.gov.ua/images/strategiya2011-2020new-5.pdf

[18] *http://gue.odessa.gov.ua/Main.aspx?sect=Page&IDPage=31506&id=106*

[19] http://oblrada.odessa.gov.ua/Main.aspx?sect=Page&IDPage=29292&id=462

installation of solar collectors in the budget entities. The Programme has a suite of annexes detailing planned measures, financing arrangements, and comparative assessment of the Oblast's renewable energy potential for selected renewable energy sources relative to other Oblasts in Ukraine[20].

The L'viv Oblast has three ongoing programmes in the field of energy saving and energy efficiency:

- 2009-2012 L'viv Oblast Household Energy Saving Programme;
- 2010-2015 L'viv Oblast Budget Entity Energy Saving Programme; and,
- 2010-2015 L'viv Oblast Municipal Utility Energy Saving Programme.

Each of the Programmes characterises the energy generation potential of renewable energy sources available in the Oblast, describes examples of existing renewable energy facilities and identifies development priorities for the renewable energy sector. However, none of the Programmes provide defined actions toward maximising the use of renewable energy potential.

The development of renewable energy is discussed in the Zakarpattia Oblast Integrated Water Resource Management Programme that discusses the construction of a chain of mini-hydropower plants (HPPs) (5 to 20 MW) on the Tisa River tributaries[21].

The 2010-2015 Dnipropetrovsk Oblast Energy Efficiency and Energy Saving Programme states that the development and use of renewable energy resources, including solar and wind energy, small hydropower, thermal energy recovered from industrial processes, geothermal energy, bio-energy and other alternative energy options are the energy efficiency priorities for the region but does not specify further implementation mechanisms[22].

An overwhelming majority of documents available at regional level often state the need for introducing renewable energy technologies, provide an estimate of available renewable energy potential, and refer to already existing facilities and ongoing projects. However, these documents lack specificity with regard to mechanisms and arrangements that can support renewable energy projects within an oblast.

Below is a brief analysis of regional (oblast) plans and programmes in the regions identified in the SER Scoping Report as having good potential for alternative

[20] http://www.donoda.gov.ua/main/ua/publication/content/7718.htmThe Programme

[21] http://www.carpathia.gov.ua/ua/publication/content/4390.htm

[22] http://oblrada.dp.ua/official-records/decisions/0/445

energy project development. Details of relevant regional programmes are provided in Appendix A.

(a) Wind

In those areas that are considered to have good wind energy potential (Crimea, Carpathian Region (L'viv Oblast), and Azov Sea Coast (Donetsk Oblast)), the need for wind energy development is recognised as a priority in the relevant regional programmes. At the same time, official websites of state administrations of the Zakarpattia, Luhansk, Zaporizhzhia, Dnipropetrovsk Oblasts and other Oblasts located in the Dnipro River Basin have been found to contain little or no information on this issue.

(b) Solar

Relevant regional programmes adopted in the Crimean Region and Odessa Oblast specifically emphasise the need for developing and applying solar energy technologies that are considered to be among the most promising renewable energy options in these areas, which supports the Scoping Report conclusions. However, in the case of the Odessa Oblast, with its good solar energy potential, other renewable energy options (e.g. biofuel and biogas) are pursued as a matter of priority – due to significant investment costs entailed in the development of solar energy facilities and longer payback period of these projects. The Administration is not able to create a supportive climate for the implementation of solar energy projects. Solar energy has not been a priority for development so far in the other southern Oblasts of Ukraine, with similarly high solar energy potential.

(c) Hydropower

A review of existing regional programmes dealing with small hydropower demonstrates that this option is more actively pursued in the Zakarpattia Oblast as compared to Central Ukraine – especially when comparing the construction of new facilities in the Tisa and Dniester River Basins vs. the rehabilitation of existing hydropower plants in the Dnipro Basin. Declarations of state support (in the view of regional programme priorities, for example) are often (but not always) signals that the investment climate for certain project types is slightly more favourable then for the others. For example, small hydropower plants in Ukraine that were among the first to receive Green Tariff licenses are situated in central Ukraine where no regional programmes on energy efficiency/renewable energy development exist.

(d) Biomass/Biogas

Due to the fact that Ukraine has a well-developed agricultural sector, agricultural waste can be used as a renewable energy resource almost anywhere within the country. Each of the above mentioned regional programmes places a

considerable focus on the development of bioenergy, but there is little planning and organisation in this area. Existing regional programmes do not offer any mechanisms that might be used to support the development of partnership and cooperation between agricultural and energy producers.

To summarise the above, the results and conclusions of the SER Scoping Report on the most suitable renewable energy technologies and optimal areas are confirmed by renewable energy development priorities identified in the regional programmes. The SER Scoping Report encompasses a broader range of areas that are considered to have good renewable energy potential then are covered by existing regional programs. It should also be noted that estimates made for the purposes of Scoping are of a preliminary nature – being largely based on the assessment of natural resource potential – and that more detailed analysis is required to take account of other potential limiting factors (e.g. the level of socio-economic development in each specific region, the investment climate, etc.).

2.5 Ukraine Environmental Legal Framework

(a) Administrative framework

Pursuant to the Presidential Decree, the Ministry of Environment and Natural Resources has been established to manage and coordinate the activities of the State Service of Ukraine for Geology and Mineral Resources, the State Agency for Water Resources of Ukraine, the State Environmental Investment Agency of Ukraine, and the State Environmental Inspectorate of Ukraine.

The Ministry is the main central executive authority responsible for environmental protection; sustainable management, reproduction and conservation of natural resources; control of the use and conservation of land resources; environmental safety, nature reserve planning and management, waste management; development, conservation and management of ecological network, and geological exploration and sustainable management of mineral resources.

(b) National Environmental Legal framework

The environmental legislation of Ukraine is rooted in the Constitution of Ukraine. The main piece of framework legislation is the Law of Ukraine on Environmental Protection[23]. Other key resource specific documents include the Land Code[24], Water Code[25], Forest Code[26], Mineral Resource Code[27]; the Laws of Ukraine "On

[23] Law of Ukraine on Environmental Protection № 1264-XII of 25.06.1991, Vidomosti Verkhovnoi Rady Ukrainy, 1991, № 41 (08.10.91), art. 546.

[24] Land Code of Ukraine № 2768-III of 25.10.2001, Vidomosti Verkhovnoi Rady Ukrainy, 2002, № 3-4 (25.01.2002), art. 27

[25] Water Code of Ukraine № 213/95-BP of 06.06.1995, Vidomosti Verkhovnoi Rady Ukrainy, 1995, № 24 (13.06.95), art. 189

Nature Reserves and Protected Areas"[28], "On Ambient Air Protection"[29], "On Animal Life[30]"; and the Law of Ukraine "On the Environmental Review"[31]. In addition, there are numerous regulations issued by various executive authorities with environmental management functions and local self-governance bodies.

The Ukrainian legislation requires an operator to obtain permits for various types of natural resource use, including in particular, emissions into the air, general-purpose and special water resource use, discharges to water bodies, and waste generation and disposal.

(c) National Environmental Laws Applicable to the Project

Environmental Impact Assessment (EIA) Law

EIA of economic projects is required by the Law of Ukraine "On Ecological Review", and under international obligations of the country (e.g. the Espoo Convention [1991]). The Ukrainian EIA process includes two related procedures: (1) assessment of environmental impacts (Ukrainian abbreviation OVNS) carried out by the proponent, and (2) state environmental review that is a part of investment integrated expert review conducted by designated state authorities.

The OVNS procedure is compulsory for all new economic projects that are "potentially hazardous to the environment". OVNS is a formal procedure regulated by a State Construction Standard (SCS) DBN A.2.2-1-2003. The SCS contains a list of project and activity types which are associated with potential environmental hazards and are therefore subject to a compulsory OVNS/ state environmental review procedure. The screening procedure for the EIA process in Ukraine is relatively weak; therefore the number of OVNS studies in the country is very high. OVNS will be required for almost all USELF projects. Energy generation on the basis of organic fuel, and hydropower plants are subject to compulsory

[26] Forest Code of Ukraine № 3852-XII of 21.01.1994, Vidomosti Verkhovnoi Rady Ukrainy, 1994, № 17 (26.04.94), art. 99

[27] Mineral Resources Code № 132/94-BP of 27.07.1994, Vidomosti Verkhovnoi Rady Ukrainy, 1994, № 36 (06.09.94), art. 340

[28] Law of Ukraine "On Nature Reserves and Protected Areas" № 2456-XII of 16.06.1992, , Vidomosti Verkhovnoi Rady Ukrainy, 1992, № 34 (25.08.92), art. 502

[29] Law of Ukraine "On Ambient Air Protection" № 2707-XII від 16.10.1992, Vidomosti Verkhovnoi Rady Ukrainy, 1992, № 50 (15.12.92), art. 678. in edition of the Law of Ukraine "On entering changes to the Law of Ukraine "On Ambient Air Protection" № 2556-III від 21.06.2001, Vidomosti Verkhovnoi Rady Ukrainy, 2001, № 48 (30.11.2001), art. 252.

[30] Law of Ukraine "On Animal Life № 2894-III of 13.12.2001, Vidomosti Verkhovnoi Rady Ukrainy 2002, № 14 (05.04.2002), art. 97

[31] Law of Ukraine "On the Environmental Review" № 45/95-BP of 09.02.1995, Vidomosti Verkhovnoi Rady Ukrainy, 1995, № 8 (21.02.95), ст. 54

OVNS procedure. Although there is no direct requirement on the OVNS for wind and solar power plants, local environmental authorities, on the basis of the SCN provisions that provides them with the authority to require an OVNS for the projects not necessarily falling into the 'potentially environmentally hazardous' category, are likely to require OVNS for the projects that need land allocation.

The existing OVNS procedure was designed by taking into account the requirements of the Aarhus Convention, to which Ukraine is a party. The SCS provisions on public engagement in the process of OVNS generally comply with international best practices in the field.

In 2010, the SCS was amended to take into account the potential risks of the planned development. According to the updated national OVNS Guidance, a risk assessment for projects subject to OVNS shall be carried out, including:

- Assessment of the population health risks potentially caused by the planned development; and,
- Assessment of the social risks potentially caused by the planned development.

The updated Guidance also stipulates that description of the technical decisions on accidents and emergencies prevention, and the control and monitoring systems for the accidents and emergencies preventions be provided in the OVNS report, along with the detailed recommendations on the risks minimisation. The Guidance contains annexes with the guidelines on the population health and social risks assessment. The amendments have been enforced since July 1, 2010.

State Environmental Review is mostly focused on the evaluation of a proposed project's compliance with environmental legislation, based on the OVNS materials provided by the proponent, but also considers broader issues of cumulative and long-term environmental impacts. The SER procedure is an integral part of the state permitting mechanism for economic projects.

An OVNS report (equivalent of the EIA Statement) provides the basis for the environmental permitting process for a new development. An OVNS report includes mitigation and compensation measures; and to certain extent plays a role of Environmental and Social Action Plan for the enterprise.

An important feature of the Ukrainian legislation is the possibility of conducting an OVNS for a certain/specific stage(s) of the project cycle. Although the primary legislation requires conducting an EIA for the entire project lifecycle, the existing practice of project preparation, approval, and implementation is based on a staged approach toward assessment and permitting.

In February 2011 Ukraine adopted The Law of Ukraine "On Regulation of Urban

Planning[32]", which aims to streamline the permitting process in the building and construction industry. The new Law stipulates that only the following developments are subject to obligatory national EIA procedure[33]:

1. Those falling into the 'IY' and 'Y' category of complexity, namely:
    a. designed for permanent stay of more than 300 persons and (or) periodic stays of more than 500 persons; or
    b. pose potential threat to more than 10,000 individuals beyond the development; or
    c. in case of failure, or in case further use is impossible (not feasible):
        i. may cause damages estimated as the amount of more than 15,000 minimum salaries;
        ii. may lead to termination of the functioning of transport, communications, energy and infrastructure at regional level; or,
        iii. may lead to loss of cultural heritage at a regional level.

2. Those falling under definitions by the Law of Ukraine "On the objects of increased potential hazard", namely, facilities where one or more hazardous substances or categories of substances are used, manufactured, processed, stored or transported to, in the quantities equal to or exceeding regulatory established threshold, as well as other facilities that pose real threat of development of the accident (emergency) of technogenic and natural character.

3. Those potentially having transboundary impacts: the result of this new Law is that the majority of USELF-funded projects will not be subject to obligatory national EIA procedure (although in practice EIA may still be undertaken in some cases if requested of the developers). It should be noted that under the previous Law many renewable energy projects in Ukraine already fell outside of obligatory national EIA procedure; however, regional environmental authorities almost always required one (and had the authority to do so). In principle, under the new regulations, environmental authorities cannot call for EIA for development not falling under the above described categories. In practice, however, the inertia is still there and the projects currently automatically go through national EIA. However, it is likely that this situation will change in the near-future.

[32] Law of Ukraine "On regulation of urban planning" N 3038-VI as of 17.02.2011, Official Herald of Ukraine, 18.03.2011 - 2011., № 18, p. 131, art. 735, act code 55190/2011

[33] Very broadly, the national OVNS report – chapter of the project documentation titled 'Assessment of the impacts on the environment', plus the procedure of checking the OVNS compliance with national environmental standards, called environmental review, a part of project permitting process, are, for the purpose of this note, called 'national EIA'

The implications of this new Law for USELF-funded projects are twofold:

1. on the one hand, national permitting process is shortened and the developer does not need to spend time and resources on the EIA study; but,
2. on the other hand, local EIA currently serves as the basis for developer's environmental and social action plans – required to comply with the EBRD environmental and social requirements. Absence of national EIA requirements could in principle lead to deterioration of local developers' and consultancies' capacity to meet EBRD performance standards.

In any case, as a result of this recent legal change, the role and potential impact of the USELF SER increases significantly. It is envisaged that this SER Environmental Report will be a valuable source of environmental information for potential USELF-funded projects (at least during the Screening stage) and that the mitigation and consultation measures outlined in the SER report and template Environmental and Social Action Plans will form the basis for project-level ESAPs that eventually becomes a part of USELF loan agreements.

National SEA

Strategic Environmental Assessment (SEA) in Ukraine, in the form of Ecological Review and public discussion of the draft laws, programs, and policies, is regulated by the Law of Ukraine "On Ecological Review". Ecological Review of strategic documents is carried out by the central Ministry; results are made public through the ministerial website.

In addition, Ukraine has signed and is preparing ratification of the SEA Protocol to the Espoo Convention. This will allow SEA to become a part of strategic planning process in Ukraine. The European Union (EU) SEA directive is one of the four environmental directives whose requirements, according to the Ukraine – EU agreement, are to be incorporated into Ukrainian legislation in the nearest future. While these regulations do not directly apply to the USELF programme, the SER process is guided by the EU Directive (along with the EBRD policies) and the Environmental Report follows its requirements.

Air and Climatic Factors

In Ukraine, air quality standards are established by the national Ministry of Health. Those standards define maximum permissible concentrations (MPCs) of pollutants for residential areas and air quality within the workplace. For certain pollutants, Ukrainian legislation defines more stringent MPCs for residential areas than those established by the European Union.

Industrial emissions in Ukraine are regulated by establishing maximum permissible emissions for each industrial facility. This approach is closely related to the concept of a buffer area (a health protection area). It is assumed that pollutant concentrations at the outer limit of such an area, taking into account

dispersion processes, should not exceed air quality standards established for residential areas. However, this approach is currently being phased out, and measurements of the emission at the source, in accordance with best EU practice, are required for newly developed enterprises.

USELF biogas/biomass projects will need to apply for an air emission permits. Air emission permits are granted for five year periods, and are based on the actual measurement of emissions and estimated total emissions, and the conception of the MPC. The application process for an air emission permit also includes publication of the declaration of intent to obtain air emission permit in the mass media, in order to provide the public with the opportunity to voice any concerns related to the new/existing development.

Additional detailed information addressing air quality and climatic factors applicable to the USELF programme are provided in Sections 3.2, 4.2, and 5.2 of this Topic Paper.

Geology and Soils

The main legal provision applicable to mining activities is the Code of Ukraine on Mineral Resources. According to the Code, subsoil resources are the sole property of the people of Ukraine, and legal entities and individuals can only use those resources in accordance with the legislation, but not own them. Companies, institutions, organisations, and citizens of Ukraine, as well as foreign legal entities and citizens can be users of subsoil resources in Ukraine and are required to pay for the use of those resources.

According to the Law of Ukraine "On Licensing Certain Types of Economic Activity"[34], extraction of subsoil resources of national significance, included in the State Mineral Resource Fund, is subject to licensing. In order to commence mining operations, a company should be granted both a mining lease and a land plot. The procedure of allocation of land plots is regulated by the Land Code of Ukraine. Currently private companies operating in Ukraine can either lease or purchase land plots for their activities.

National regulations (Land Code of Ukraine) foresee top fertile soil layer protection during construction. Measures of top soil protection and construction site re-cultivation are an obligatory part of the OVNS report.

Additional detailed information addressing geology and soils applicable to the USELF programme are provided in Sections 3.4, 4.4, and 5.4 of this Topic Paper.

[34] Law of Ukraine "On Licensing Certain Types of Economic Activity" № 1775-III of 01.06.2000, Vidomosti Verkhovnoi Rady Ukrainy of 08.09.2000 - 2000 p., № 36, art 299.

Surface Water and Groundwater

The legal requirements of water resource use are set forth by the Water Code of Ukraine, which distinguishes between general-purpose and special water resource use and establishes a procedure for obtaining permits for various types of special water resource use, including wastewater discharge into water bodies. The quality of surface and ground water is regulated by establishing MPCs for pollutants. For the same pollutant, different MPCs apply to water bodies used for service and utility purposes and for fisheries. Similar to the air quality standards (see above), the Ukrainian water quality standards may differ from the respective EU standards.

Coastal zones of the sea and the river banks are called 'water protection zones' (the width varies depending on the type of the water body) where any economic activates, including construction, are prohibited. Unfortunately, according to regional environmental authorities these requirements are not fully enforced and significant part of the Black and Azov Seas are under illegal or partly legal construction of recreational facilities.

National environmental/resource usage regulations do not contain any guidance/limits on water diversions or minimal flow requirements. The Water Code of Ukraine (art.96) stipulates assessment of the impacts on water resources of any development projects. Hydrotechnical engineering works are subject to compulsory OVNS (EIA) procedures. These requirements will include, where relevant, assessment of the impacts on the water flow of hydropower plant construction, as well as other potential impacts of alternative energy source development.

Additional detailed information addressing surface water and groundwater applicable to the USELF programme are provided in Sections 3.3, 4.3, and 5.3 of this Topic Paper.

Landscapes and Biodiversity

The Law of Ukraine "On Nature Reserves and Protected Areas of Ukraine" provides the framework for the establishment, protection, and management of nature reserves and protected areas, and the classification of these areas. Some protected areas are allowed to be held in private ownership.

The Law stipulates the creation of territories and objects of nature reserve fund protection zones. These protection zones shall be created to ensure the necessary regime of nature reserve fund objects protection and the prevention of any negative influences of economic activity on them. In protection zones it is not permissible to build industrial and other objects, or to develop economic activity which can cause negative influence on nature reserve fund territories and objects.

Such influence shall be evaluated on the basis of ecological assessment.

All biodiversity conservation activities in Ukraine are governed by the United Nations Biodiversity Convention and Pan-European Strategy for Biological and Landscape Diversity. The 2005-2025 State Biodiversity Conservation Programme stipulates that the detailed Programme should be developed and adopted by June 2011.

Legal framework for biodiversity and protected species in Ukraine consists of two framework legal acts: the Law of Ukraine 'On Protection of Environment' and the Law of Ukraine 'On the Red Book of Ukraine'[35].

Article 64 of the Law of Ukraine 'On Protection of Environment' identifies two types of flora and fauna that are subject of special protection and are included into the Red Book of Ukraine: rare varieties and species, and varieties and species that are under the threat of extinction. The Law does not provide the definitions of the above terminology (although similar terms are used for the categories of the Red Book of Ukraine and these categories are defined below).

The Law on Ukraine 'On the Red Book of Ukraine', Article 3 stipulates that the Red Book of Ukraine is an official state document, which contains the list of rare varieties and species and varieties and species that are under the threat of extinction. These include fauna species within the territory of Ukraine, its continental shelf and exclusive economic (marine) zone, as well as generalised data on the current state of these varieties and species and measures taken to preserve and reproduce them.

The Red Book defines the following categories:

- **extinct** – species for which information on their presence in nature or in artificially created habitats is absent after repeated search in the typical localities of habitation or any other known and possible propagation spaces;
- **extinct in nature** – species extinct in nature but preserved in the artificial habitats;
- **endangered** – species that are under the threat of extinction in natural conditions and survival of which is unlikely if the impacts of negative factors affecting their populations continue;
- **vulnerable** – species that could, in the near future, fall under the endangered category, if the impacts of negative factors affecting their

[35] Law on Ukraine 'On the Red Book of Ukraine'№ 3055-III of 07.02.2002, , Vidomosti Verkhovnoi Rady Ukrainy, 2002, № 30 (26.07.2002), art. 201

populations continue;

- **rare** – species with currently small populations that are not falling into endangered or vulnerable categories but are still under the threat;
- **not assessed** – species that are suspected as belonging in the endangered, vulnerable, or rare categories, but not have been adequately categorised yet; and,
- **not sufficiently known** – species that could not be placed into any of the above categories because of the lack of comprehensive and reliable information.

All species included into the Red Book of Ukraine are equally protected; there is no differentiation of liabilities for damage caused to the species falling into different Red Book categories. Flora and fauna species listed in the Red Book of Ukraine are considered natural resources of state importance and are subject to special protection within the entire territory of Ukraine, its continental shelf, and its exclusive (marine) economic zone. According the procedure envisaged by the Law, the rights of the land owners of where Red Book species are located can be restricted for the purpose of protecting these species, the environment, and civil rights.

Catching, harvesting, collection of the Red Book species is only allowed under exceptional circumstances for scientific and selection purposes, including for the purposes of reproduction, resettlement, and breeding in the artificial habitats, and for the populations propagation. These activities can only be implemented by the permission of the Ministry of Environmental Protection of Ukraine based on the decision of the national Commission on the Red Book of Ukraine. The procedure and the form for issuing the permissions for special usage (catch, harvest) of the species in the Red Book of Ukraine has been regulated by the Order of the Ministry of Environmental Protection of Ukraine since 1993[36].

Ukrainian law provides for administrative and criminal responsibility for breaching the laws on protection, usage and reproduction of the rare flora and fauna species and those included in Red Book of Ukraine. In addition to criminal or administrative charges, violators may also be required to provide payment for damages. The amount of compensation for each violation, as well as compensation for elimination or damage of their habitats is established by the Cabinet of Ministry of Ukraine[37] using a defined estimation method.

[36] Order of the Ministry of Environmental protection of Ukraine "on approval of the instruction on the order of issuing the permits on harvesting (collecting) flora and fauna species included into the Red Book of Ukraine; application forms and permits templates on such harvesting' N 3 as of 01.02.1993

[37] Decree of the Cabinet of Ministers of Ukraine 'On the size of the compensation for harvesting (collection) and damage cause to the flora and fauna species included into the Red Book of Ukraine" N 399 as of 01.06.1993, collection of the Decrees of the government of Ukraine, 1993, N 11, p.226

Environmental and land permitting procedures for the renewable projects will take into account, among other factors, the presence of the protected species and/or their habitats/migratory routes on the territories potentially affected by the development. Depending on the project scale and the nature of the impacts, mitigation/compensatory measures and/or changes in technologies or siting (location) could be required by relevant authorities on these grounds.

Additional detailed information addressing landscape and biodiversity applicable to the USELF programme are provided in Sections 3.5, 4.5, and 5.5 of this Topic Paper.

Waste Management

Waste management is regulated by the Law of Ukraine "On Waste Management"[38]. The legislation defines four hazard classes for waste: first and second class waste is considered hazardous, requires special treatment, and should be separated from the overall waste stream. Third and fourth class waste can be processed together with common household waste. If, during the course of its operations, an industrial facility generates hazardous waste, the hazardous waste should be removed and processed or disposed of by a specialised company which possesses a state permit for the handling of hazardous waste. The generation and disposal of waste by industrial facilities is regulated by permits and limits issued by authorised state bodies. The procedure for the preparation, approval and revision of permits for waste generation and disposal is established by the Cabinet of Ministers of Ukraine.

Renewable energy projects will have to apply for relevant waste generation and disposal permits. Wastes disposal could be problematic in certain remote areas because of the lack of treatment facilities (such as in areas like Carpaty), or highly populated areas (such as Crimea) because of the insufficient waste disposal capacities in the area.

State Sanitary Rules and Norms of Ukraine 2.2.7.029-99 "Hygienic requirements for handling industrial wastes and identification of the level of their hazard class to population health" defines the basic rules of waste handling in Ukraine. The above Norms stipulate that production and consumption wastes are divided into four classes of hazard depending on physical, chemical, and biological characteristics of the whole waste mass or its individual ingredients as follows: First class – extremely hazardous substances (wastes); Second class – highly hazardous substances (wastes); Third class – relatively hazardous substances (wastes); Fourth class – low hazardous substances (wastes).

[38] Law of Ukraine "On Waste Management" № 187/98-BP of 05.03.1998, of 25.09.1998 - 1998 p., Vidomosti Verkhovnoi Rady Ukrainy № 36, art 242

Hazard class is defined by the toxicity of industrial wastes. Wastes are called toxic industrial wastes if they are formed during the technological process cycle in the industry and have in their content physiologically active substances that cause toxic effect. Waste hazard class is defined by the wastes producer or on his behalf (usually done by the licensed organisation, and shall be approved by regional health authorities and agreed with regional environmental authorities). There is national guidance and a methodological handbook on the procedure of establishing waste categories; however regional (Oblast) variations in waste classifications exist. The majority of wastes that are characteristic of renewable energy development – such as construction debris, etc. – will fall into the fourth class (low-hazardous substances that could be disposed at the solid domestic wastes landfill). However, certain wastes (such as accumulators, solar elements etc.) could potentially fall into the third or second class, requiring licensed disposal.

(d) National Social and Public Laws Applicable to the Project

Occupational Health and Safety

The Law of Ukraine "On Hazardous Facilities" defines legal, economic, social and organisational basis for activities related to hazardous facilities. The law is aimed at protecting the environment, as well as human health and human life, from the adverse effects of accidents at those facilities by means of appropriate accident prevention and response (containment and elimination). It is unlikely that any of the renewable energy facilities considered for this SER will fall within the 'Hazardous Facilities' category.

The core piece of legislation in the field of occupational health and safety (OHS) is the Law of Ukraine "On Labour Protection"[39], which applies to all legal entities and individuals that use labour. The Code of Labour Legislation of Ukraine addresses OHS issues in Section XI "Labour Protection" and in a number of other sections, including "Work Contract", "Work Time", "Rest Time", "Women's Labour", and "Youth Labour". The Ukrainian OHS legislation also includes the Law of Ukraine "On Compulsory State Insurance against Occupational Accidents and Diseases Resulting in the Loss of Capacity for Work"[40]. Certain procedures related to occupational health and safety are also regulated by the Law of Ukraine "On Collective Agreements"[41]. The Ukrainian OHS legislation is generally based on the

[39] Law of Ukraine "On Labour Protection № 2694-XII of 14.10.1992, Vidomosti Verkhovnoi Rady Ukrainy of 08.12.1992 - 1992 p., № 49, art 668.

[40] Law of Ukraine "On Compulsory State Insurance against Occupational Accidents and Diseases Resulting in the Loss of Capacity for Work" № 1105-XIV of 23.09.1999, Vidomosti Verkhovnoi Rady Ukrainy of 26.11.1999 - 1999 p., № 46, art 403

[41] Law of Ukraine "On Collective Agreements" № 3356-XII of 01.07.1993, Vidomosti Verkhovnoi Rady Ukrainy of

principles and approaches of the International Labour Organisation (ILO), to which Ukraine is a member country.

Other than 'the Law of Ukraine on Hazardous Facilities', all of the above described regulations on labour safety are anticipated to be applicable during the construction, operation, maintenance and decommissioning stages of any renewable energy project.

Community Health and Safety

The Law of Ukraine "On Ensuring Sanitary and Epidemiological Well-Being of Population"[42] and respective secondary legislation addresses the issue of protecting community health during the process of construction and operation of industrial facilities. This Law defines procedures for the construction of a centralised water supply and wastewater disposal systems, as well as wastewater treatment facilities, and addresses issues related to the lighting regime and solar radiation, the wind regime, and other facilities. The Law of Ukraine "On Regulating of Urban Development Activities[43] ensures the protection of public interests and cultural and historical heritage in the process of investment/economic activities.

These regulations will apply to USELF projects when defining the acceptable noise levels (wind turbines), electromagnetic radiation (transmission lines), and others potentially harmful physical factors generated by the project.

Public Consultation and Disclosure

The public's right to access environmental information is regulated by a number of fundamental legal acts, including the Laws of Ukraine "On Information"[44], "On Citizens' Appeals"[45], "On State Secrets"[46], and the Aarhus Convention. The

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07.09.1993 - 1993 p., № 36, art 361.

[42] Law of Ukraine "On Ensuring Sanitary and Epidemiological Well-Being of Population № 4004-XII від 24.02.1994, Vidomosti Verkhovnoi Rady Ukrainy, 1994, № 27 (05.07.94), ст. 218

[43] Law of Ukraine "On regulating of urban development activities» № 3038-VI of 17.02.2011, Official Herald of Ukraine of 18.03.2011 - 2011 p., № 18, p. 131, art 735

[44] Law of Ukraine "On Information" № 2657-XII of 02.10.1992, Vidomosti Verkhovnoi Rady Ukrainy, 1992, № 48 (01.12.92), ст. 650 in the edition of the Law of Ukraine "On entering changes to the Law of Ukraine "On Information" № 2938-VI від 13.01.2011, Official Herald of Ukraine of 18.02.2011 - 2011 p., № 10, p. 21, art 445

[45] Law of Ukraine "On Citizens' Appeals"№ 393/96-ВР від 02.10.1996, Vidomosti Verkhovnoi Rady Ukrainy , 1996, № 47 (19.11.96), ст. 256

[46] Law of Ukraine "On State Secrets" № 3855-XII of 21.01.1994, Vidomosti Verkhovnoi Rady Ukrainy, 1994, № 16 (19.04.94),art. 93

national EIA (OVNS) procedure provides for public disclosure of the following documents:

- Declaration of Intent, which must be published in the mass media and contain, in particular, information on the planned activity and on the locations where OVNS materials are available to the public; and,
- Declaration of Environmental Effects, which must be prepared after the completion of the environmental impact assessment (EIA) study and contain a summary of the key OVNS results.

The Law of Ukraine 'On access to Public Information'[47] recently came into force on May 9, 2011. The objective of the new Law is to expand the rights of citizens to obtain information from public bodies. The Law stipulates a range of measures that significantly improve public access to information. For example, the time period within which information providers shall address a request submitted by the public is shortened to five business days following receipt of the request; and a response shall be given immediately, but no later than within 48 hours, following receipt of request for information related to environmental situations, both real and potential, that threatens people's security. In addition to the traditional formats for information requests (written and oral personal submission), the Law stipulates new ones, such as mail, phone, fax, email.

Executive Bodies have to bring the Regulatory Acts into accordance with the new Law. In this regard, it could be reasonably expected that the Provision on the Order of Providing Environmental Information will be, as a minimum, amended to take into account new time-frames for information provision and requests forms; or alternatively, that the Provision will be fully re-drafted and updated.

National requirements on public consultations and disclosure are further detailed in the Stakeholder Engagement Plan (SEP) included as an Annex to the SER Environmental Report. The SEP defines the procedures used to invite and incorporate public consultation and disclose information that is contained in this Topic Paper and the SER Environmental Report as a whole.

Involuntary Resettlement

Currently Ukraine does not have a clearly defined procedure for involuntary resettlement associated with the implementation of economic projects. Requirements with regard to resettlement processes and addressing related property issues are scattered across various laws and regulations, with many issues remaining unaddressed. The key issues related to resettlement process are

[47] Law of Ukraine 'On access to public information' # 2939-VI as of 13.01.2011. Official Herald of Ukraine 18.02.2011, #10, p.29

those of acquisition (purchasing) of land for the construction of new facilities and buildings, for various purposes including in particular, providing housing for citizens.

Involuntary resettlement in Ukraine is only possible for projects of State Significance (these projects could be private business projects or private-state consortiums)[48]. The State Significance status is assigned to a range of projects, such as those that generate high taxes, provide important employment opportunities, and produce products of regional/national importance. If the State proceeds with its declared intention to drastically increase energy generation from renewable sources, some or all, renewable energy projects could be assigned the State Significance status.

Land acquisition that does not require resettlement is regulated by the Land Code of Ukraine. Compensation for damages suffered by individuals or legal entities is only established by the court following an application by the party that suffered the damage.

In cases were a developer negotiates resettlement terms with affected individuals without resorting to involuntary resettlement, there shall be a legal agreement (land purchase contract, trade agreement, or other) voluntarily signed by both parties. Specific regulations pertinent to the nature of the agreement will apply; however, there is no specific legal act regulating the resettlement process.

Cultural Heritage (including architectural and archaeological heritage)

The Law of Ukraine "On the Protection of Cultural Heritage"[49] regulates legal, institutional, social and economic relations associated with the protection of cultural heritage assets. Such assets may include terrestrial habitat sites, water bodies, other natural or natural/man-made or man-made sites. All protected sites are recorded in the Inventory of Sites of National or Local Significance. Any construction activity within the mandatory protection zone established around these sites is subject to a special permit.

Definition of archaeological heritage, authorities of management bodies in the sphere of archaeological heritage protection (Cabinet of Ministers), scope of archaeological research, and rights and duties of the explorer of archaeological heritage are defined by the Law of Ukraine "On Protection of Archaeological

[48] Law of Ukraine «On Alienation of Land Plots and Other Objects of Immovable Property Located On Them in Private Ownership for the Social Needs and on the Grounds of Social Necessity» № 1559-VI as of 17.11.2009, Official herald of Ukraine 25.12.2009 - 2009 ., № 97

[49] Law of Ukraine "On the Protection of Cultural Heritage" № 1805-III від 08.06. 2000, Official Herald of Ukraine of 21.07.2000 - 2000 p., № 27, p. 32, art 1112

Heritage"[50]. Pursuant to the Law, archaeological finds shall be the property of the state.

Requirements on the protection of cultural and archaeological heritage might influence the siting (location) of the renewable projects, especially in such historically rich areas as Crimea and some of the Western Ukraine towns.

Additional detailed information addressing cultural heritage applicable to the USELF programme is provided in Sections 3.7, 4.7, and 5.7 of this Topic Paper.

(e) Other Relevant National Strategies and Plans

The regulatory environment in Ukraine is characterised by a large amount of strategic documents, mainly plans, programmes, policies, and concepts. They may have administrative, territorial, (inter)sectoral focus, or be of a combined nature. For example, all Oblasts in Ukraine are required by Law to develop their own development strategies.

The timeframes for strategic documents vary between five to 20 years. Not all of them contain implementation and monitoring mechanisms, and some of them are not supported by a financial evaluation. As a result, implementation varies from case to case.

Apart from the Energy Strategy of Ukraine (discussed above), National Programmes on ecological network development, water use and development, land protection, development of protected areas, and others, are potentially or directly relevant to the SER process for the USELF programme. These documents introduce environmental limitations and requirements on economic use of natural resources, such as water and land, and will directly influence the permitting process for renewable energy projects. A full list of programmes that are applicable to the SER is shown in Appendix A.

(f) International Environmental and Social Requirements Applied to the Project

International Finance Institutions Requirements

In addition to Ukraine Laws, Strategies and Policies on renewable energy and the environment, this SER will conform to requirements and principles contained in the EBRD Environmental and Social Policy, which includes the EBRD Performance Requirements; the EBRD Public Information Policy; and the EBRD Strategy for Ukraine. All projects to be supported by USELF will also be required to conform to these policies.

The EBRD Environmental and Social Policy (2008) details the commitments of the

[50] Law of Ukraine "On Protection of Archaeological Heritage" № 1626-IV of 18.03.2004, Verkhovnoi Rady Ukrainy of 25.06.2004 - 2004 p., № 26, p. 1080, art 361

agreement establishing the Bank particularly for the "promotion of environmentally sound and sustainable development". It contains within it the EBRD Performance Requirements; which clients are expected to meet, covering key areas of environmental and social impacts and issues (discussed in more detail below).

The EBRD Public Information Policy (2008) sets out how the EBRD discloses information and consults with its stakeholders so as to promote better awareness and understanding of its strategies, policies and operations. *The EBRD Strategy for Ukraine (2007)* sets out the key achievements, challenges and main operational priorities for the EBRD in Ukraine.

The following EU Directives and Guidelines and other international finance institution requirements will also be followed and applied to the USELF SER development:

- Equator Principles and IFC Performance Standards;
- EU Directive 2001/42/EC – The Strategic Environmental Assessment (SEA);
- Guidance on EU SEA Directive 2001/42/EC implementation: an assessment of the effects of certain plans and programs on the environment (2003);
- EU Directive 2009/147/EC – Bird Directive on the conservation of wild birds the conservation of wild birds (amended version of Directive 79/409/EEC);
- EU Directive 92/42/EEC – Habitats Directive on the protection of sensitive and vulnerable natural habitats;
- EU Directive 2000/60/EC – Water Framework Directive;
- EU Directive 96/62/EC – Air Quality Framework Directive;
- Natura 2000 Network, which is a centrepiece of the EU nature and biodiversity policy combining key components of EU Bird and Habitats Directives. Since Ukraine is not a member of the EU, there are no Natura areas; however, for the purposes of this SER, we consider that National Parks, protected habitat areas, or other areas protected for conservation value to be the equivalent of Natura areas; and,
- Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC (2007).

EBRD Performance Requirements

The EBRD will seek to ensure through its environmental and social appraisal and monitoring processes that the projects it finances are socially and environmentally sustainable; respect the rights of affected workers and communities; and are designed and operated in compliance with applicable regulatory requirements and good international practice. In order to translate this objective into successful practical outcomes, the Bank has adopted a comprehensive set of specific Performance Requirements ('PRs') that clients are expected to meet, covering key areas of environmental and social impacts and issues.

The ten Environmental and Social Performance Requirements that apply to EBRD

projects, including the USELF programme, are listed in Table 2-3.

Table 2-3 List of Performance Requirements (PRs) approved and adopted by EBRD for Bank-financed projects

Performance Requirement	Description
PR 1: Environmental and Social Appraisal and Management	PR 1 outlines the client's responsibilities in the process of appraising, managing and monitoring environmental and social issues associated with projects proposed for EBRD financing. Engagement with the project stakeholders is an integral part of this process (specified in PR 10). Objectives: Let the client to consider in an integrated manner the potential environmental and social issues and impacts associated with the proposed project. Appraisal process includes environmental and social risk assessments, auditing, environmental and social impact assessment and mitigation measures to avoid, minimise, mitigate and/or compensate adverse impacts on workers, affected communities and environmental conditions.
PR 2: Labour and Working Conditions	Objectives: To enhance the client's human resources policy by establishing and maintaining a sound worker-management relationships, promoting fair treatment, non-discriminative and equal opportunities for workers, protecting and promoting the health of workers as well as healthy working conditions.
PR 3: Pollution Prevention and Abatement	The impacts and issues associated with polluting activities need to be considered in all economic activities, and from effluents and emissions at the facility level, to impacts at a regional and global level where appropriate. Objectives: To avoid or, where avoidance is not possible, minimise adverse impacts on human health, and the environment by avoiding or minimising pollution directly arising from projects; to assist clients in identifying project-related opportunities for energy and resource efficiency improvements and waste reduction; and to promote the reduction of project-related greenhouse gas emissions.
PR 4: Community Health & Safety and Security	Proposed projects may increase the potential for community exposure to risks and impacts arising from temporary or permanent changes in population; transport of raw and finished materials; construction, operations and decommissioning; accidents, structural failures, and releases of hazardous materials. Objectives: (i) to avoid or minimise risks to and impacts on the health and safety of the local community during the project life cycle from both routine and non-routine circumstances; (ii) to ensure that the safeguarding of project-related personnel and property is carried out in a legitimate manner that avoids or minimises risks to the community's safety and security.
PR 5: Land Acquisition, Involuntary Resettlement and Economic Displacement	Objectives: (i) to avoid or, at least minimise, involuntary resettlement wherever feasible by exploring alternative project designs; (ii) to mitigate adverse social and economic impacts from land acquisition or restrictions on affected persons' use of and access to land; (iii) to improve or, at a minimum, restore the livelihoods and standards of living of displaced persons (iv) to improve living conditions among displaced persons through provision of adequate housing with security of tenure at resettlement sites.
PR 6: Biodiversity Conservation and Sustainable	Objectives: To protect and conserve biodiversity; to avoid, minimise and mitigate impacts on biodiversity and offset significant residual impacts, where appropriate, with the aim of achieving no net loss or a net gain of

Performance Requirement	Description
Resource Management	biodiversity; to promote the sustainable management and use of natural resources; to ensure that Indigenous peoples and local communities participate appropriately in decision-making; to provide for fair and equitable sharing of the benefits from project development and arising out of the utilisation of genetic resources; to strengthen companies' license to operate, reputation and competitive advantage through best practice management of biodiversity as a business risk and opportunity; to foster the development of pro-biodiversity business that offers alternative livelihoods in place of unsustainable exploitation of the natural environment.
PR 7: Indigenous Peoples	Objectives: (i) to ensure that the transition process fosters full respect for the dignity, rights, aspirations, cultures and natural resource-based livelihoods of Indigenous Peoples; (ii) to avoid adverse impacts of projects on the lives and livelihoods of Indigenous Peoples' communities, or when avoidance is not feasible, to minimise, mitigate, or compensate for such impacts; (iii) to enable Indigenous Peoples to benefit from projects in a culturally appropriate manner; (iv) to support the client to establish and maintain an ongoing relationship with the Indigenous Peoples affected by a project throughout the life of the project (v) to foster good faith negotiation of the client with, and the informed participation of, Indigenous Peoples when projects are to be located on traditional or customary lands used by the Indigenous Peoples, when customary or non-traditional livelihoods will be affected by the project, or in the case of commercial exploitation of the Indigenous Peoples' cultural resources; (vi) to recognise and respect the customary laws and customs of Indigenous Peoples and to take these into full consideration; (vii) to respect and preserve the culture, knowledge and practices of Indigenous Peoples in accordance with their wishes.
PR 8: Cultural Heritage	Objectives: To support the conservation of cultural heritage in the context of EBRD-financed projects; to protect cultural heritage from adverse impacts of project activities; to promote the equitable sharing of benefits from the use of cultural heritage in business activities; to promote the awareness of and appreciation of cultural heritage where possible.
PR 9: Financial Intermediaries (FI)	Objectives: (i) to establish a practical way in which the Bank's mandate to promote sustainable development can be implemented in its FI investments, in line with best international practice in the commercial financial sector; (ii) to enable FIs to manage environmental and social risks associated with their business activities and to promote good environmental and social business practices amongst their clients; (iii) to promote good environmental and human resource management within FIs.
PR 10: Information Disclosure and Stakeholder Engagement	The EBRD considers stakeholder engagement as an essential part of good business practices and corporate citizenship, and a way of improving the quality of projects. In particular, effective community engagement is central to the successful management of risks and impacts on communities affected by projects, as well as central to achieving enhanced community benefits. Stakeholder engagement is an ongoing process involving (i) the client's public disclosure of appropriate information so as to enable meaningful consultation with stakeholders, (ii) meaningful consultation with potentially affected parties, and (iii) a procedure or policy by which people can make comments or complaints. This process should begin at the earliest stage of project planning and continue throughout the life of the project.

Performance Requirement	Description
	This PR outlines a systematic approach to stakeholder engagement that will help clients build and maintain over time a constructive relationship with their stakeholders, in particular the locally affected communities. The process of stakeholder engagement is an essential component of the appraisal, management and monitoring of environmental and social issues associated with the client's investments. Therefore, this performance requirement should be read in conjunction with PR 1.

PRs 1 to 8 and 10 include the requirements for direct investment operations; PR 2 and PR 9 are for financial intermediary operations. Each PR defines, in its objectives, the desired outcomes, followed by specific requirements for clients to help them achieve these outcomes. Compliance with relevant national laws is an integral part of all PRs.

EBRD Project Categorisation

As detailed in the EBRD Environmental and Social Policy (2008), EBRD categorises proposed projects as A/B/C/FI based on environmental and social criteria to: (i) reflect the level of potential environmental and social impacts and issues associated with the proposed project; and (ii) determine the nature and level of environmental and social investigations, information disclosure and stakeholder engagement required for each project, taking into account the nature, location, sensitivity and scale of the project, and the nature and magnitude of its possible environmental and social impact and issues.

Category A: A proposed project is classified as Category A when it could result in potentially significant and diverse adverse future environmental and/ or social impacts and issues which, at the time of categorisation, cannot readily be identifies or assessed and which require a formalised and participatory assessment process carried out by independent third party specialists in accordance with the PRs.

Category B: A proposed project is classified as Category B when the potential adverse environmental and/ or social impacts that it may give rise to are typically site-specific, and/ or readily identified and addressed through mitigation measures. These impacts could be from past, current or future activities. Due diligence requirements may vary depending on the project and will be agreed with the EBRD on a case-by-case basis, in accordance with PR 1.

Category C: A proposed project is classified as Category C when it is likely to result in minimal or no adverse environmental or social impacts and therefore requires no further environmental and social appraisal beyond categorisation.

Category 'FI': A proposed project will be classified as 'FI' if the EBRD provides financing to a financial intermediary (FI).

International conventions and agreements

Ukraine is a party to more than 40 international conventions and agreements in the field of nature protection. Among the most relevant to this project are:

Espoo Convention on EIA in a transboundary context, 1991

The Convention on Environmental Impact Assessment in a Transboundary Context is a United Nations Economic Commission for Europe (UNECE) convention signed in Espoo, Finland, in 1991 that entered into force in 1997. The Convention sets out the obligations of Parties - that is States that have agreed to be bound by the Convention -- to carry out an environmental impact assessment of certain activities at an early stage of planning. It also lays down the general obligation of States to notify and consult each other on all major projects under consideration that are likely to have a significant adverse environmental impact across boundaries.

Convention requires that an environmental impacts assessment be carried out for certain types of activity planned usually by one Party, which are likely to have a significant environmental impact within an area under the jurisdiction of another Party. It specifies what has to be considered at an early stage of planning and it lays down the obligation of countries to notify and consult each other and the public. It requires that all comments received from the public and authorities, as well as the findings of the assessment, are taken into account when deciding on the planned activity.

The Convention involves a Party (or Parties) of origin (States where an activity is planned) and an affected Party (or Parties) (States whose territory may be significantly adversely affected by the activity).

Protocol on Strategic Environmental Assessment (SEA) to the Espoo convention (effective July 11, 2010)

The Convention on Environmental Impact Assessment (EIA) in a Transboundary Context has been supplemented by a Protocol on Strategic Environmental Assessment (SEA). The Protocol was adopted and be opened for signature at the Ministerial 'Environment for Europe' Conference in Kyiv, Ukraine, on 21 May 2003. It entered into force on 11 July 2010.

The Protocol requires its Parties to evaluate the environmental consequences of their official draft plans and programmes. The Protocol also addresses policies and legislation, though the application of SEA to these is not mandatory. SEA is undertaken much earlier in the decision-making process than EIA, and it is therefore seen as a key tool for sustainable development. SEA allows the identification and prevention of possible environmental impact right from the start in decision-making — developing a more sustainable transport policy rather than just minimising the environmental impact of building a road, for example — and it enables environmental objectives to be considered on a par with socio-

economic ones, bringing sustainable development closer.

The Protocol provides for extensive public participation in government decision-making in numerous development sectors, from land-use planning to transport and from agriculture to industry, covering everything from oil refineries to ski-lifts. The public not only has the right to know about plans and programmes, but also the right to comment, have their comments taken into account, and be told of the final decision and why it was taken.

Besides considering the typical environmental effects of plans and programmes, the Protocol places a special emphasis on the consideration of human health, going beyond existing legislation in the region.

The Convention on the Conservation of Migratory Species of Wild Animals (known as CMS or Bonn Convention)

The Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or the Bonn Convention) aims to conserve terrestrial, marine and avian migratory species throughout their range. It is an intergovernmental treaty, concluded under the aegis of the United Nations Environment Programme, concerned with the conservation of wildlife and habitats on a global scale. Since the Convention's entry into force, its membership has grown steadily to include over 100 Parties from Africa, Central and South America, Asia, Europe and Oceania. The Convention was signed in 1979 in Bonn (hence the name) and entered into force in 1983.

The objective of the Bonn Convention is the conservation of migratory species worldwide. Wild animals require special attention because of their importance from the environmental, ecological, genetic, scientific, recreational, cultural, educational, social and economic points of view.

The parties to the Convention acknowledge the importance of conserving migratory species, and the need to pay special attention to species the conservation status of which is unfavourable.

To avoid any migratory species becoming endangered, the parties must endeavour:

- To promote, cooperate in or support research relating to migratory species;
- To provide immediate protection for migratory species included in Appendix I of the Convention;
- To conclude Agreements covering the conservation and management of migratory species listed in Appendix II of the Convention;
- To protect endangered migratory species, the parties to the Convention will endeavour:
- To conserve or restore the habitats of endangered species;

- To prevent, remove, compensate for or minimise the adverse effects of activities or obstacles that impede the migration of the species; and
- To the extent feasible and appropriate, to prevent, reduce or control factors that are endangering or are likely to further endanger the species.

The Convention on the Conservation of European Wildlife and Natural Habitats (usually known as the 'Bern Convention')

The main objectives of the Convention on the Conservation of European Wildlife and Natural Habitats, signed in 1979, are to conserve wild flora and fauna and their natural habitats, especially those species and habitats whose conservation requires the co-operation of several States. Particular emphasis is given to endangered and vulnerable species, including migratory species. In order to achieve this the Convention imposes legal obligations on contracting parties, protecting over 500 wild plant species and more than 1000 wild animal species. Each Contracting Party is obliged to undertake, in its planning and development policies and in its measures against pollution, to have regard to the conservation of wild flora and fauna.

Convention on Wetlands of International Importance especially as Waterfowl Habitat (usually known as the 'Ramsar Convention')

The Convention on Wetlands of International Importance especially as Waterfowl Habitat was signed in Ramsar, Iran in 1971. It is an inter-governmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources, as a means to achieving sustainable development throughout the world.

The original emphasis was on the conservation and wise use of wetlands primarily to provide habitat for waterbirds. However, over the years the Convention has broadened its scope to incorporate all aspects of wetland conservation and wise use, recognising wetlands as ecosystems that are extremely important for biodiversity conservation and for the well-being of human communities. The Convention's mission is the conservation and wise use of all wetlands through local, regional and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world.

Agreement on the Conservation of Populations of European Bats (commonly known as EUROBATS)

The Agreement on the Conservation of Populations of European Bats, which came into force in 1994, presently numbers thirty European states (including Ukraine) among its Parties. The Agreement was set up under the Convention on the Conservation of Migratory Species of Wild Animals, which recognises that endangered migratory-species can be properly protected only if activities are carried out over the entire migratory range of the species.

The Bat Agreement aims to protect all 52 species of bats identified in Europe,

through legislation, education, conservation measures and international co-operation with Agreement members and with those who have not yet joined.

In 1995, the First Session of the Meeting of Parties to the Agreement formed an Action Plan, which was to be translated into international action. They established an Advisory Committee to carry forward this Plan between the Meetings of Parties. The most significant items for the Advisory Committee are monitoring and international activities. A pan-European observation study is to identify population trends and then to facilitate the timely introduction of measures to address any problems which the study's results might throw up. The study is based upon representative species, and consistent methods for observing them are to be used.

International-protection measures for bats have, above all, to concentrate on those species which migrate the furthest across Europe, in order to identify and address possible dangers caused by bottle-neck situations in their migratory routes. Therefore, the Advisory Committee is also to examine the available data about the migratory behaviour of representative bat-species.

The results of these studies are intended to lead to a comprehensive international programme for the conservation of the most endangered bat-species in Europe.

UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (commonly known as the 'Water Convention')

The Convention of the Protection and Use of Transboundary Watercourses and International Lakes (the 'Water Convention') is intended to strengthen national measures for the protection and ecologically sound management of transboundary surface waters and groundwaters. The Convention obliges Parties to prevent, control and reduce water pollution from point and non-point sources. The Convention also includes provisions for monitoring, research and development, consultations, warning and alarm systems, mutual assistance, institutional arrangements, and the exchange and protection of information, as well as public access to information.

UNECE Aarhus Convention on access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters

The UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, usually known as the Aarhus Convention, was signed on June 25, 1998 in the Danish city of Aarhus. It entered into force on 30 October 2001. As of July 2009, it had been signed by 40 (primarily European and Central Asian) countries and the European Union and ratified by 41 countries. It had also been ratified by the European Community, which has begun applying Aarhus-type principles in its legislation, notably the Water Framework Directive (Directive 2000/60/EC).

The Aarhus Convention grants the public rights regarding access to information,

public participation and access to justice, in governmental decision-making processes on matters concerning the local, national and transboundary environment. It focuses on interactions between the public and public authorities.

The Aarhus Convention is a multilateral environmental agreement through which the opportunities for citizens to access environmental information are increased and transparent and reliable regulation procedure is secured. It is a way of enhancing the environmental governance network, introducing a reactive and trustworthy relationship between civil society and governments and adding the novelty of a mechanism created to empower the value of public participation in the decision making process and guarantee access to justice: a "governance-by-disclosure" that leads a shift toward an environmentally responsible society. The Aarhus Convention was drafted by governments, with the highly required participation of NGOs, and is legally binding for all the States who ratified it becoming Parties. Among the latter is included the EC, who therefore has the task to ensure compliance not only within the member States but also for its institutions, all those bodies who carry out public administrative duties. Each Party has the commitment to promote the principles contained in the convention and to fill out a national report, always embracing a consultative and transparent process.

Other relevant environmental agreements and conventions to which Ukraine is party are listed in Appendix B.

3. BASELINE DATA

3.1 General Environmental and Social Baseline

(a) Introduction

The SER topic paper identifies the current state and characteristics of the environment, known as the 'baseline'. This baseline provides the basis for predicting and monitoring environmental effects. The SER also describes the evolution of the baseline environment without the implementation of renewable energy projects up to 2040 (known as the future baseline).

The baseline environment and future baseline environment are described according to a series of topics, these being aspects of the environment that could be affected by the renewable energy projects promoted under the USELF programme.

The topic areas comprise:

- Climate and Air Quality;
- Surface water and Groundwater;
- Geology and Soils;

- Landscape and Biodiversity;
- Community and Socio-economics; and,
- Cultural Heritage.

(b) Information sources used

Various statistical, official, and internet sources were consulted when preparing the baseline sections below. Information was gathered through a combination of publically-available websites, documents, and publications. The majority of the data came from national reports on the state of the environment of Ukraine, available on-line.

A list of the websites consulted, documents and publications cited, and GIS data sources utilised within this report is included in Appendix C.

3.2 Climate and Air Quality

(a) Climate and Air Quality Baseline Conditions

The majority of Ukraine's climate is temperate continental; however, it is subtropical in the south of the Crimean peninsula. Variable weather is typical for Ukraine due to cyclones and anticyclones, which occur an average of 45 and 36 times annually respectively. The mean annual air temperature ranges from +6 °C in the northern part of the country to +13 °C in the south. There are significant seasonal and regional variations in temperature. Atmospheric precipitation is unevenly distributed during the year. The mean annual precipitation decreases from the west and northwest (550-650 mm per year) to the south and southeast (300-350 mm per year). The maximum precipitation occurs in the Ukrainian Carpathian (more than 1,500 mm per year) and in the Crimean Mountains (about 1,000 mm per year). On a country-wide scale, wind conditions vary over the year. The average near surface wind speed in Ukraine is 4 m/s. The average amount of sunlight hours increases from 1,700 in the northwest of Ukraine to 2,400 hours/year in the southeast and south.

Due to prevailing westerly winds, the vast majority of the air-borne pollutants are transported to Ukraine from central and eastern Europe, while air pollutant loads from Ukraine are mainly transferred further east to Russia. The energy sector in Ukraine is a major contributor to local air pollution. Fuel and Energy Complex (FEC) enterprises are considered second by capacity (after the metallurgy industry) as a source of pollutant emissions to the atmosphere. More than 80% of all emissions of thermal power plants are from eight large thermal power plants, mostly located in the Donetsk-Pridniprovsk region.

The Ukraine Parliament ratified the Kyoto Protocol in February 2004. Ukraine is an Annex 1 party to the Kyoto Protocol and Ukraine is required to fulfil relevant commitments and can participate in emissions trading mechanisms. The 2006

report titled "Ukraine's Report on Demonstrable Progress. Under the Kyoto Protocol" mentions that Ukraine can readily meet the target 1990 emission levels for greenhouse gas (GHG) emissions during the 2008-2012 period.

The energy sector contributes about 70% of total domestic emissions of greenhouse gases (GHGs) in Ukraine and is the main source of carbon dioxide (CO_2) and methane (CH_4) emissions in the country. The combustion of fossil fuels, particularly coal, is the most significant contributor to CO_2 emissions. Globally, Ukraine ranks twentieth in the emissions of CO_2 from fuel combustion and eighth in energy-related CH_4 emissions. Greenhouse gas emissions in Ukraine decreased through the 1990s, mostly due to the sharp economic decline. Since 2001, greenhouse gas emissions have grown. As previously stated, Ukraine's total greenhouse gas emissions in 2004 were 45% of their 1990 level. Both the CO_2 emissions from fuel combustion and fugitive CH_4 emissions from coal have fallen significantly since 1990. However, fugitive CH_4 emissions from oil and gas have dropped by only 25% for the same period of time.

(b) Climate and Air Quality Future Trends in Baseline

Current projections of the effects of climate change indicate that Ukraine may experience an increased frequency and magnitude of winter floods, decreased water availability, increased variability in crop yields and potentially decreased crop yield with increased soil erosion, increased health effects from heat waves, and severe fires in drained peatland[51]. Drought risk is expected to increase to the extent that 100-year droughts today will return every 50 years or less by the 2070s.

Although some projections indicate the potential for some agricultural benefits attributable to climate-change, it is not clear that Ukraine will benefit from such changes; since any benefits are likely to be offset by increased variability and extreme events. There are also issues of agricultural efficiency to consider. Ukraine will most likely face a mix of losses and gains[52].

According to latest reports, an exceptionally large area of depleted ozone has formed over the North Pole, and scientists are warning that it could settle over Scandinavia and Eastern Europe by early spring 2011. It is not clear if this thinning of the ozone layer in eastern Europe is part of a larger phenomenon. According to the ten-year forecast, changes in ozone layer conditions will be variable. Solar activity is variable as well. Scientists are estimating that the next solar activity maximum will occur in 2012, and a minimum in 2019.

[51] IPCC, 2007

[52] World Bank, 2009

The National Atlas of Ukraine lists a map of the air temperatures in Ukraine by decades in the 20th century. Figure 3-1 indicates that air temperatures have been steadily climbing since the 1980s (the last two decades on the 20th century), specifically in the northern and eastern Ukraine; but not in Crimea.

Trends in air quality in Ukraine are contradictory. Without additional policy measures and technological innovations, the country's greenhouse gas emissions will continue to increase with economic recovery. Since a significant increase in coal consumption for electricity and heat production is envisioned for Ukraine, increased greenhouse gas emissions would be expected. Changes in Ukraine's energy efficiency will also lead to potential emissions decrease. Financial hardships could force enterprises to switch from more expensive gas to coal and oil as a source of energy, which could increase GHG emission. If financing is not secured for implementing air emission mitigation measures, and the level of energy and heat generation does not drop, air pollution in industrialised parts of Ukraine would be expected to increase.

Figure 3-2 shows the areas of stationary air emissions from cities in Ukraine. The air pollution density is highest in areas where heavy industry is present. This is concentrated predominantly in the eastern parts of Ukraine and a few western oblasts. The impact of any new renewable energy development in these high air pollution density areas should help mitigate problems associated with air pollution by replacing fossil-fuel based energy with clean and carbon neutral renewable energy and thus reduce emissions.

A 2006 report by the Ministry of Environmental Protection of Ukraine[53] forecasts are that the total volume of fuel combustion in 2020 will increase by 13% compared to 2005 levels, including doubling of coal combustion, liquid fuels combustion increase by 81% and gas combustion reduction by 33%. The report predicts that fossil fuel combustion related CO2 emissions will consequently increase by 25%. Figure 3-3 and Figure 3-4, extracted from the 2006 report, projects the GHG emissions to 2030. The drop in GHG emissions from 1990 to 2000 is related to the collapse of the Soviet system and the resultant economic instability. The figures indicate that Ukraine will likely fulfil its commitments under the Kyoto Protocol during the first commitment period (2008-2012) and in 2020 even under optimistic scenario (i.e., optimistic for industrial growth) predictions.

(c) Climate and Air Quality Data Sources

The baseline climatic data presented above was obtained from the sources noted in Appendix .

[53] Ministry of Environmental Protection of Ukraine: *Ukraine's Report on Demonstrable Progress Under the Kyoto Protocol* (2006) (http://unfccc.int/resource/docs/dpr/ukr1.pdf)

The paper Air Pollution Costs in Ukraine, available at the Social Science Research Network Electronic Paper Collection (http://ssrn.com/abstract=932511); and the 2006 report titled Ukraine's Report on Demonstrable Progress Under the Kyoto Protocol (http://unfccc.int/resource/docs/dpr/ukr1.pdf), were also reviewed.

(d) Climate and Air Quality Data Quality

The climate and air quality data for Ukraine is generally unreliable, because it is limited in extent and detail. For example, in 'Air Pollution Costs in Ukraine', it is noted that there is a lack of reliable emissions monitoring systems, and that levels of PM10 and PM2.5 are not monitored on a frequent basis in Ukraine.

(e) Climate and Air Quality Data Gaps

Data gaps include a lack of data and records defining air quality and trends, resulting in low reliability of the baseline air quality data. In addition, there are no published target emissions levels.

(f) Climate and Air Quality Constraints and Opportunities for Renewable Energy

The key constraints and opportunities for renewable energy in relation to climate and air quality are summarised in Table 3-1.

Table 3-1: Constraints and Opportunities in relation to Climate and Air Quality

Constraints	Opportunities
• For wind power: possible changes in wind characteristics (speed, constancy, etc); • All renewable energy types: climate change may increase frequency and scale of hazards and disasters; • The economic decline may cause manufacturing reduction and an improvement of air quality; that may decrease the interest of the local authorities in renewable energy projects development; • Climate-change driven alterations to wind and rainfall patterns could alter the business case for wind, solar and small hydropower schemes; and, • Existing farming practices have air quality and climate impacts, which may be exacerbated by requirements for continuous supply of biomass.	• All renewable energy types: Reduction in GHG (including carbon) and other air pollutants compared to energy generated by non-renewable means; • Favourable wind conditions in Ukrainian Carpathian and Crimean Mountains (wind); • Good indexes of insolation in the southern part of Ukraine (Solar PV); • Changing structure of agricultural cropping (biomass); • Increasing air pollution may stimulate development of green technologies; and, • See climate-change driven alterations under 'constraints'.

(g) Climate and Air Quality Figures

The figures that follow have been referenced within Section 3.2 of this Topic Paper (the Climate and Air Quality baseline and future baseline text):

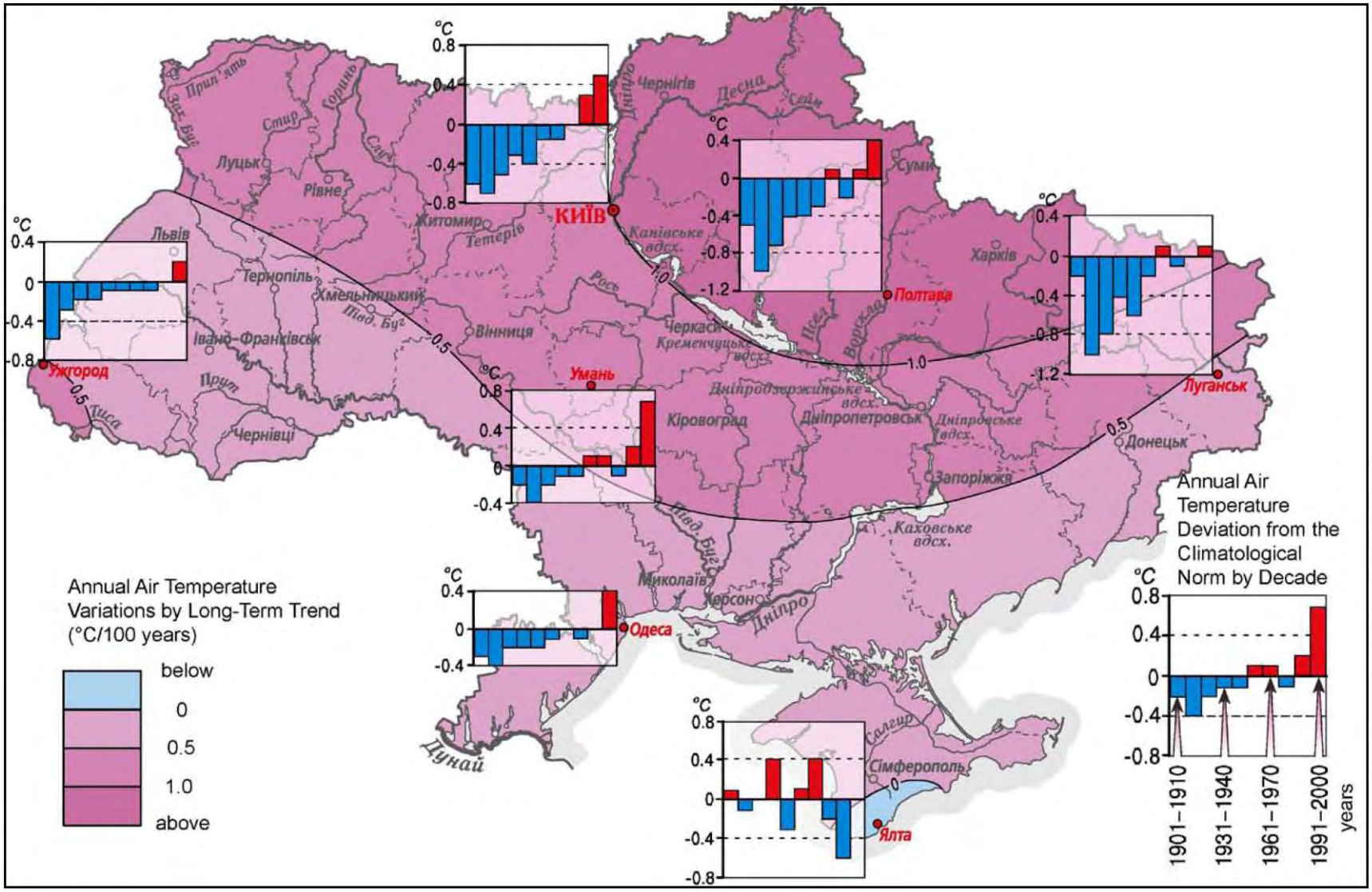

Figure 3-1: Annual Air Temperature Variations of the 20th Century (After Barabash, M.B., Grebenyuk, N.P., and Kulbida, M.I, 2010.)

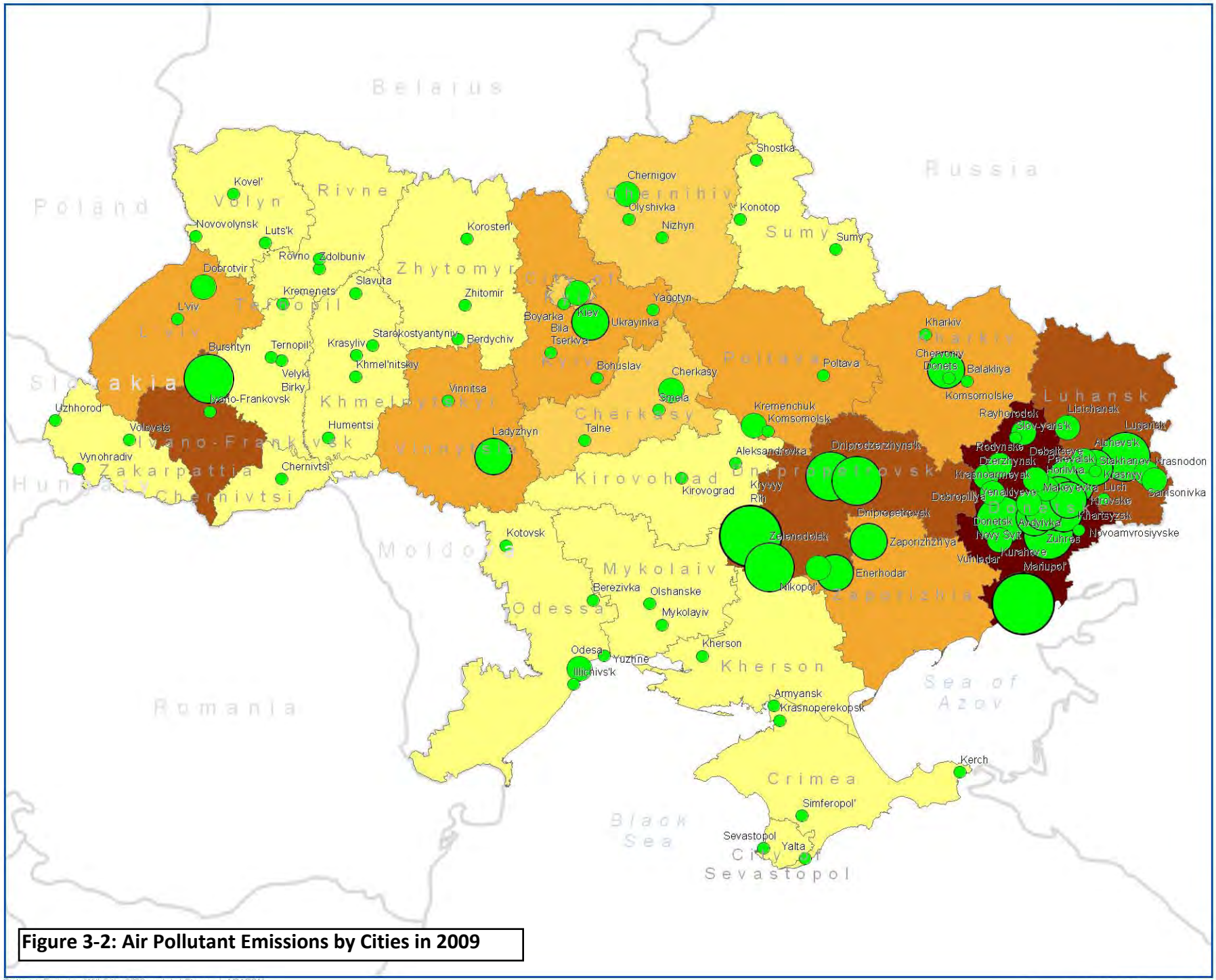

Figure 3-2: Air Pollutant Emissions by Cities in 2009

Ukraine Sustainable Energy Lending Facility Strategic Environmental Review

Air Pollutant Emissions 2009

Legend

Stationary Emissions (Th. Tons)

- 3 - 30
- 31 - 80
- 81 - 200
- 201 - 800
- 801 - 1,300
- ocean

Emissions by City (Th. Tons)

- 0 - 10
- 11 - 50
- 51 - 100
- 101 - 200
- 201 - 322
- ocean

Data Sources: ArcWorld Supplement; Michael Bauer Research GmbH, EuroGeographics; National Committee of Statistics, Ukraine

N
W E
S

0 50 100
Kilometers

1 cm = 60 km

USELF
Ukraine Sustainable Energy Lending Facility

BLACK & VEATCH
Building a world of difference.

StationaryEmissionsWithCities2009.mxd | J. Steurer | 4/24/2011

Data source(s): ESRI, World Database on Protected Places, CIAT-CSI (http://srtm.csi.cgiar.org), PVGIS

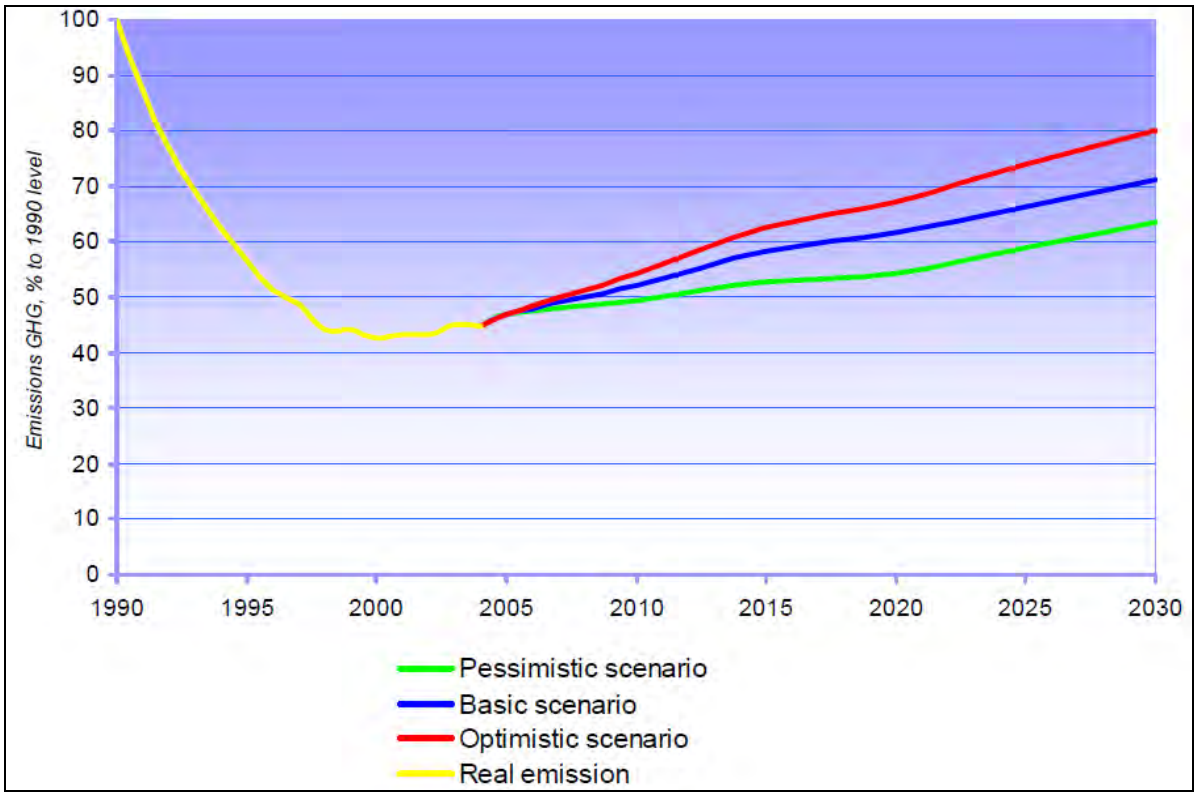

Figure 3-3: Projected Greenhouse Gas Emission Scenarios for Ukraine up to 2030 (After Ukraine Report on Demonstrable Progress under the Kyoto Protocol, 2006)

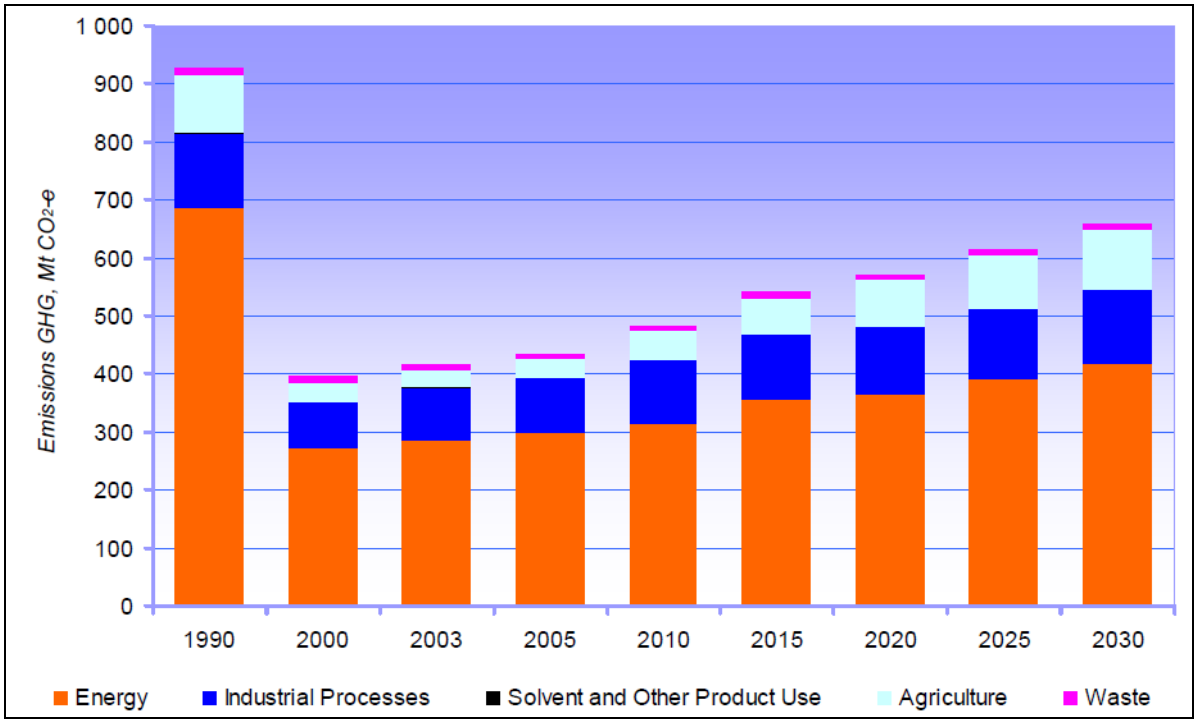

Figure 3-4: Projected Greenhouse Gas Emissions by Source up to 2030 (After Ukraine Report on Demonstrable Progress under the Kyoto Protocol, 2006)

3.3 Surface Water and Groundwater

(a) Surface Water and Groundwater Baseline Conditions

Hydrography

Water resources are not equally distributed throughout Ukraine. Sufficient resources are found in the north, north-western and western parts of the country, while the eastern and southern regions, with the highest concentration of industry and agriculture, experience fresh water deficits. Figure 3-5 and Figure 3-6 present a combined view of Ukraine showing general distribution and availability of both surface and groundwater resources. Kyivska and Zakarpatska oblasts and more generally the western regions have maximal availability of fresh water; while fresh water supply is insufficient in the south, southeast and east, in particular the Autonomous Republic of Crimea and Donetsk, Kharkiv, Lugansk, Odessa and Mykolaiv oblasts.

Ukrainian rivers are divided into three sea basins – Black Sea, Sea of Azov and the Baltic Sea. The majority of the territory of Ukraine (98%) is within the catchment basin of the Sea of Azov and the Black Sea. There are 63,119 rivers in Ukraine, including nine large (with a watershed area of more than 50,000 km^2), 81 medium (from 2,000 to 50,000 km^2), and 63,029 small (less than 2,000 km^2) watersheds. The total length of the country's river network is estimated as 206,400 km, 90% of which is comprised of small rivers. About 200,000 Km of the river network drains into the Black Sea and the Sea of Azov.

The main Ukrainian rivers are displayed in Figure 3-5 and are characterised in Table 3-2.

Table 3-2: Major rivers in Ukraine

River name	Basin area, km2	Total length, km	% of all Ukraine's river watersheds within basin
Dnieper (Dnipro)	504,000	2,201	28
Dniester	72,100	1,352	24
Pivdennyj Buh	63,700	806	9
Danube (3.8%*)	801,463	2,850	26

*Only 3.8% of the total Danube basin area is within Ukraine

Table 3-3 demonstrates the variability in index of river network density (Km of river length per Km^2 of area) by major river basins in Ukraine. The highest index of river network density is found in the Carpathian region. This is expected given the mountainous state of the Carpathian region. In the Dniester river basin, the index of river network density decreases from the basin headwaters toward the lower reaches. In the Pivdennyj Buh and Dnipro river basins, the indices of river network density changes from 0.73-0.40 km/km^2 in the headwaters to 0.2-0.16

km/km^2 downstream and from 0.35-0.59 to 0.12-0.18 km/km^2, respectively.

Table 3-3: Major river networks in Ukraine

Basin	Basin area km^2	River network density, km/km^2 of area	Geographic location
Prut River	27,500	0.94	Carpathian Mountains
Dniester River	68,627	1.0-1.7 – headwaters 0.2-0.18 – lower basin	Ukrainian Carpathians
Pivdennyj Buh River	63,700	0.73 – headwaters 0.2-0.16 – lower basin	South-western Ukraine
Dnieper (Dnipro) River	504,000	0.35-0.59 – headwaters 0.12-0.18 – lower basin	Russia, Belarus, Ukraine

Currently, the majority of hydropower plants in Ukraine are large installations with reservoirs located on the mainstream sections of the Dneiper and Dniester rivers (further information is provided in the Technical Report on Small-Hydropower (a supporting document to the SER Environmental Report). Beyond these large facilities, there is little detailed information that is publicly available on the hydropower potential for specific river basins within Ukraine. However, key areas with small-hydropower development potential (less than 10MW) include:

- Dniester River basin;
- Tisa River Basin; and
- Tributaries of Dneiper River, and areas in Central Ukraine.

Flooding is a significant risk in floodplains, flood prone areas, and low lying areas along the rivers and streams in large portions of Ukraine. Primary flood season is late winter to mid spring. Flooding is caused by snow melt, rainfall, and/or a combination of these events, and general storm events. Flood depths or water rise during spring flooding can vary from three to ten metres in the western part of Ukraine and from two to greater than five metres in central and eastern Ukraine and portions of Crimea. Figure 3-7 displays types of flooding (source of flooding) by region, maximum water level rise along rivers by region, and average and maximum range of rise in water level (in metres) with site specific dates for the beginning and ending of the spring flooding season. It should be noted that Figure 3-7 is very large scale and the width of floodplains is approximate.

		
View showing the lower Dnipro River in Kherson.	The Buh River near the town of Doroshivka.	View looking south from Mykolaiv along the Buh River.

Flood control facilities include more than 1,100 water storage basins, 28,000 reservoirs, seven major channels and 10 main aqueducts in the watersheds of Dnipro, Dnister, Danube, Siverskyj Donec, Pivdennyj Buh, and Zahidnyj Buh rivers. Risk of flooding is still considered to be high, particularly in Dnister, Prut and Syret basins (all in the western region of Ukraine). The main reasons for the high flood risk are limited capabilities of the flood control facilities, lack of investment, and inadequate level of modernisation. Uncontrolled construction in water withdrawal zones is an additional factor that causes flooding and other negative impacts on water bodies.

Groundwater and Water Resources

Total groundwater resources in Ukraine are estimated to be 20 km^3 per year. Figure 3-6 presents Groundwater Resources in Ukraine available in Litres/Sec per km^2. Fresh groundwater aquifers are found at the depth of 300-400m in the northern regions of the country, and at 100-150m in the southern regions. Groundwater in aquifers lying below these levels is usually salty. Total volume of the annual river discharge in Ukraine is among the highest in Europe (about 210 km^3); but only 25% of this amount originates at the territory of Ukraine (local discharge); while the rest is from beyond Ukrainian borders (transit discharge). Actual water availability per capita in Ukraine is among the lowest in Europe. This applies both to the surface and ground water resources.

Figure 3-8 presents overall water use by watersheds and by the type of use. The percentage of water use that comes from groundwater abstraction is also provided by watersheds. The quality of drinking water in Ukraine often fails to meet national standards[54], which poses a threat to the public health. Decline in drinking water quality, along with groundwater pollution, and deterioration of the conditions of main rivers, is reported in the regions where coal and metal mining and raw materials processing are traditionally concentrated (the east and southeast regions of the country).

[54] United Nations Development Programme, 2002 "Ukraine Country Profile" from Johannesburg Summit, page 38. Published by the United Nations, 2002.

Surface Water Quality

In 1999, all river basins in Ukraine, apart from the rivers in Crimea, were classified as moderately or significantly polluted. It should be noted; however, that the water quality standards applied are in some cases stricter than those applied in EU countries. According to various sources, the most serious causes of pollution are municipal economy, ferrous and non-ferrous metallurgy, heavy engineering, and agriculture. Mining activities also represent a serious threat, causing discharge of heavy metals and other harmful substances. The Dnieper River, the primary source of drinking water to 60% of the Ukrainian population, is often cited as a 'classic example of non-sustainable usage'; the concentration of several pollutants, such as ferrous ions and ammonium in the water of Dnieper reservoirs in industrial regions, is reported to repeatedly exceed national standards. Table 3-4 displays water supply and water drainage.

Table 3-4: Water Supply and Water Drainage, Basic Indicators (in Mm^3)

	1990	2000	2005	2009
Consumption of Fresh Water (including Sea Water)	30,201	12,991	10,188	9,113
For Production	16,247	6,957	5,706	5,149
For Household and Drinking Purposes	4,647	3,311	2,409	1,956
Discharge of Waste Waters	20,261	10,964	8,900	7,692
Polluted	3,199	3,313	3,444	1,766
Without Purification	470	758	896	270
With Purification to Standards	3,318	2,100	1,315	1,711
Total Waste and Treated (recycled) Waters	67,661	41,523	47,167	41,379
Treatment (Purification) Facility Capacity	8,131	7,992	7,688	7,581

Reference: based on "Statistics Yearbook for Ukraine, 2009 by State Statistics Committee of Ukraine", P. 517

Industrial activities (included in Production Activities) are the sources of large volumes of insufficiently treated (12-20% of total discharge volume) or, in some cases, untreated wastewater (up to 7%). Water losses in the distribution infrastructure are greater than 30%. This percentage loss is supported by the difference between Consumption of Fresh Water and the summation of Fresh Water used for Production and for Household and Drinking in Table 3-4.

Radioactive material from the Chernobyl nuclear power plant accident in 1986 resulted in levels of radioactive material in surface water systems in areas close to the reactor site and in many other parts of Europe. While ^{137}Cs and ^{90}Sr levels in water and fish of rivers, open lakes and reservoirs are currently low, in some "closed" lakes with no out-flowing streams in Ukraine both water and fish will remain contaminated with ^{137}Cs for decades to come.

In the long term, secondary inputs by runoff of long lived ^{137}Cs and ^{90}Sr from soils continues (at a much lower level) to the present day. At the present time, activity concentrations both in surface waters are low, therefore, irrigation with surface water is not considered to be a hazard.

(b) Surface Water and Groundwater Future Trends in Baseline

Analyses of long-term surface water quality monitoring data (including seawater quality) indicate that the overall level of water pollution does not significantly change regardless of the economic situation and level of industrial output. Overloaded sewerage systems and treatment facilities that are old, in poor-to-average condition, and are not regularly maintained or rebuilt are one of the primary causes of continued water quality deterioration.

The volume of discharged water has declined as a result of the industrial recession during 1995-2009 (see Table 3-4). During the last five years, the per capita water use in Ukraine has decreased, but industrial water consumption has constantly increased. This trend is expected to continue unless steps to modernise industries are implemented. Power generation (including electricity), domestic and municipal consumption, agriculture, and metallurgy industries are the main water users in Ukraine. With the expected recovery of heavy industry, it is reasonable to expect significant growth of water discharges along with water consumption for industrial purposes. However, the quality of drinking water continues to deteriorate as indicated by sanitation, chemical, and bacteriological characteristics, with no indications or major initiatives to reverse this trend. For example, water treatment capacity has been steadily declining since 1990 (see Table 3-4, treatment capacity). Variations in water quality across Ukraine are presented in Figure 3-9, Figure 3-10 and Figure 3-11.

Future trends in climate change may produce changes in long term watershed and groundwater characteristics (in particular precipitation/runoff and groundwater contributions) and should be considered in long term project planning. Long term impacts to surface water and groundwater resources were generally characterised for Ukraine as: more flooding from increased precipitation (rainfall) , especially in winter; less summer rainfall that could lead to more water stress (shortages, etc); and significant increases in the frequency of severe droughts[55].

(c) Surface Water and Groundwater Data Sources

Primary data, reports and internet resources used are listed in Section 3.1(b). The following sources were also used for the surface water and groundwater text:

[55] Met Office, UK (January, 2010) *Impacts of Climate Change Ukraine*. www.metoffice.gov.uk

- "Chemical Composition and Water Quality of Surface Waters in Ukraine", by Osadchy, V., Osadcha, N., and Nabyvanets, Ju. Ukrianina Hydrometeorlogical research Institute, Kiev. Published in Transactions on Biomedicine and Health, Vol. 7, 2003;
- "Development of the Surface Water Quantity and Water Quality Monitoring in Ukraine: Problems and Needs", by Manukalo, V. Deputy Chairman State Hydrometeorological Service. Published in International Congress on River Basin Management, 2007 by General Directorate of State Hydraulic Works (DSI), Turkey (Http://www2.dsi.gov.tr/english/congress2007/); and,
- Impacts of Climate Change Ukraine", published by the Met Office, UK January, 2010 [www.metoffice.gov.uk]).

(d) Surface Water and Groundwater Data Quality

Surface and groundwater data records are readily available to renewable energy developers. Generalised data developed at a national scale is available but both extent of data and lengths of the data records are unknown at this time. Figure 3-12 presents a national view of the data collection stations from a surface water perspective. Surface water and groundwater indicators are presented in sections 3.3 (a) and (b). Local conditions for surface water and groundwater availability, quality, and flooding risks should always be researched as part of any site-specific preliminary site assessment.

While national coverage is course, details for small installations of the type USELF will support would most likely require supplementary local data to address baseline surface and groundwater conditions expected at a potential USELF development site. Figure 3-12 represents a starting point to identify national level data collection points that may be close to a proposed USELF site. Further local research, which may include a local data collection programme, would be required to follow.

(e) Surface Water and Groundwater Data Gaps

Lack of a robust surface and groundwater monitoring data across the country is a long standing critical issue. The national network is at a coarse geographic scale, and the majority of river miles are not adequately covered if monitored at all. The data record is also relatively short, and contains gaps, and only a limited range of data types are samples and / or measured.

In order to address gaps in the data for surface and groundwater data, an evaluation of locally available data is necessary at the design stage at sites proposed for development under USELF. Data would be obtained via research and queries to the relevant Ukrainian ministries (i.e.; Ministry of Environmental

Protection), Institutes, (i.e.: Ukrainian Hydro-meteorological Research Institute, Kiev) and oblast authorities. Where data gaps are identified, a local data collection programme may be required for those types of facilities that potentially impact surface or groundwater; primarily, biomass and hydropower facilities to support project development, design, and permitting. This data would incidentally fill in critical data gaps, as well as potentially improve the overall national data collection network and database for the Government of Ukraine.

Cooperative local programmes can also assist in developing a more robust network system. Projects like those supported by the USELF programme and others should be able to be cooperative contributors to the national network.

(f) Surface Water and Groundwater Constraints and Opportunities for Renewable Energy

The key constraints and opportunities for renewable energy in relation to surface water and groundwater are summarised in Table 3-5.

Table 3-5: Constraints and Opportunities in relation to surface water and groundwater

Constraints	Opportunities
Small Hydropower • Small hydropower developments must, through necessity, be placed within the floodplain and will therefore decrease the flood storage area available; • Uncontrolled land use in water intake zones; • Short term impacts from land disturbance during construction need to be addressed to control impacts to surface water and groundwater resources and quality; • Operations may impact quantity of river flow used for pollutant discharge and dilution if reservoir operations are included at a small size facility; • Operators may have to share available water (operate with environmental or other constraints) with other users (irrigation, water supply, wastewater dilution, etc);	*Small Hydropower* • Development might be seen and promoted as an alternative to large power station (re)construction, the latter are one of the causes of water shortage in some parts of the country; • The density of small rivers with high potential (high head, adequate flow) for small hydropower development suggests multiple developments in a watershed (in particular certain watersheds in western Ukraine); • The possibilities to use existing hydropower facilities (with necessary upgrading); • Turbine use of river water can at times improve dissolved oxygen (water quality) through turbulence and when designed with mechanical oxygen injection; • Spillage over a dam or weir increases dissolved oxygen content of a river from entraining air in the

Constraints	Opportunities
	spilling turbulent water thereby improving water quality;
Biogas (landfill Gas-LFG) • Short term impacts from land disturbance during construction need to be addressed to control impacts to surface water and groundwater resources and quality; • Landfill drainage and seepage control would not be impacted by new facility construction and operation;	*Biogas (Landfill Gas-LFG)* • Improvements to landfill runoff and/or drainage control; • Improvements to local infrastructure;
Biomass (animal waste) • Short term impacts from land disturbance during construction need to be addressed to control impacts to surface water and groundwater resources and quality;	Biomass (animal waste) • Training in improved waste management procedures; • Better waste management procedures translates into more product for energy production; • Improvements to local infrastructure;
Wind • Short term impacts from land disturbance during construction need to be addressed to control impacts to surface water and groundwater resources and quality;	Wind • Power can be generated without the need to discharge temperature or contaminant-laden water;
Solar • Short term impacts from land disturbance during construction need to be addressed to control impacts to surface water and groundwater resources and quality.	Solar • Power can be generated without the need to discharge temperature or contaminant-laden water.

(g) Surface Water and Groundwater Figures

The figures that follow have been referenced within Section 3.3 of this Topic Paper (the Surface Water and Groundwater baseline and future baseline text):

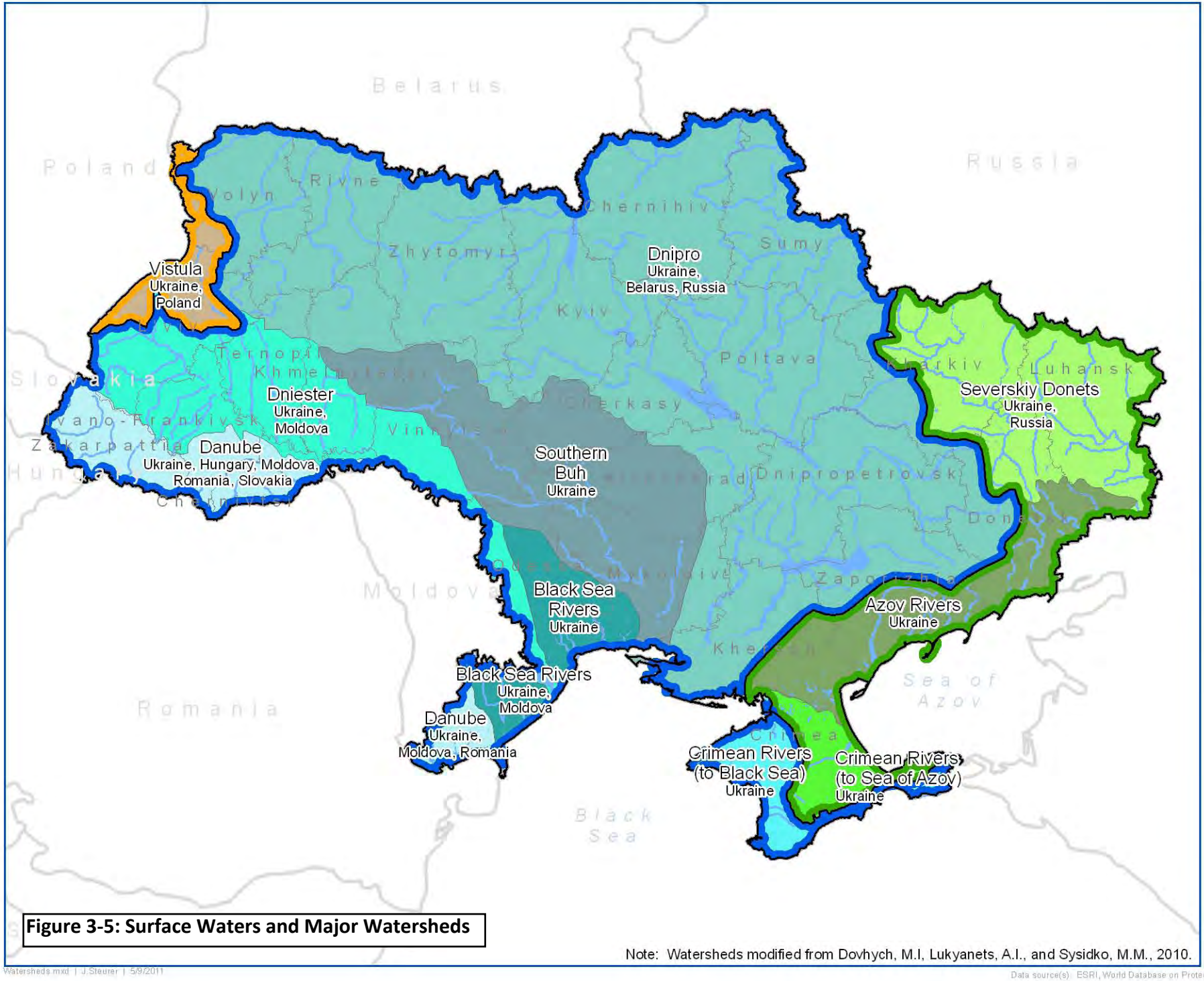

Figure 3-5: Surface Waters and Major Watersheds

Note: Watersheds modified from Dovhych, M.I, Lukyanets, A.I., and Sysidko, M.M., 2010.

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Major Watersheds

Legend

Black Sea Watersheds
- Black Sea Rivers
- Crimean Rivers (to Black Sea)
- Danube
- Dniester
- Dnipro
- Southern Buh

Sea of Azov Watersheds
- Azov Rivers
- Crimean Rivers (to Sea of Azov)
- Severskiy Donets

Baltic Sea Watershed
- Vistula

Base Level
- Baltic Sea
- Black Sea
- Sea of Azov

Data Sources: National Atlas of Ukraine; DeLorme; ArcWorld Supplement; SRTM; FAO (UN)

N W E S

0 50 100
Kilometers

1 cm = 60 km

USELF Ukraine Sustainable Energy Lending Facility

BLACK & VEATCH Building a world of difference.

Watersheds.mxd | J.Steurer | 5/9/2011

Data source(s): ESRI, World Database on Protected Places, CIAT-CSI (http://srtm.csi.cgiar.org), PVGIS

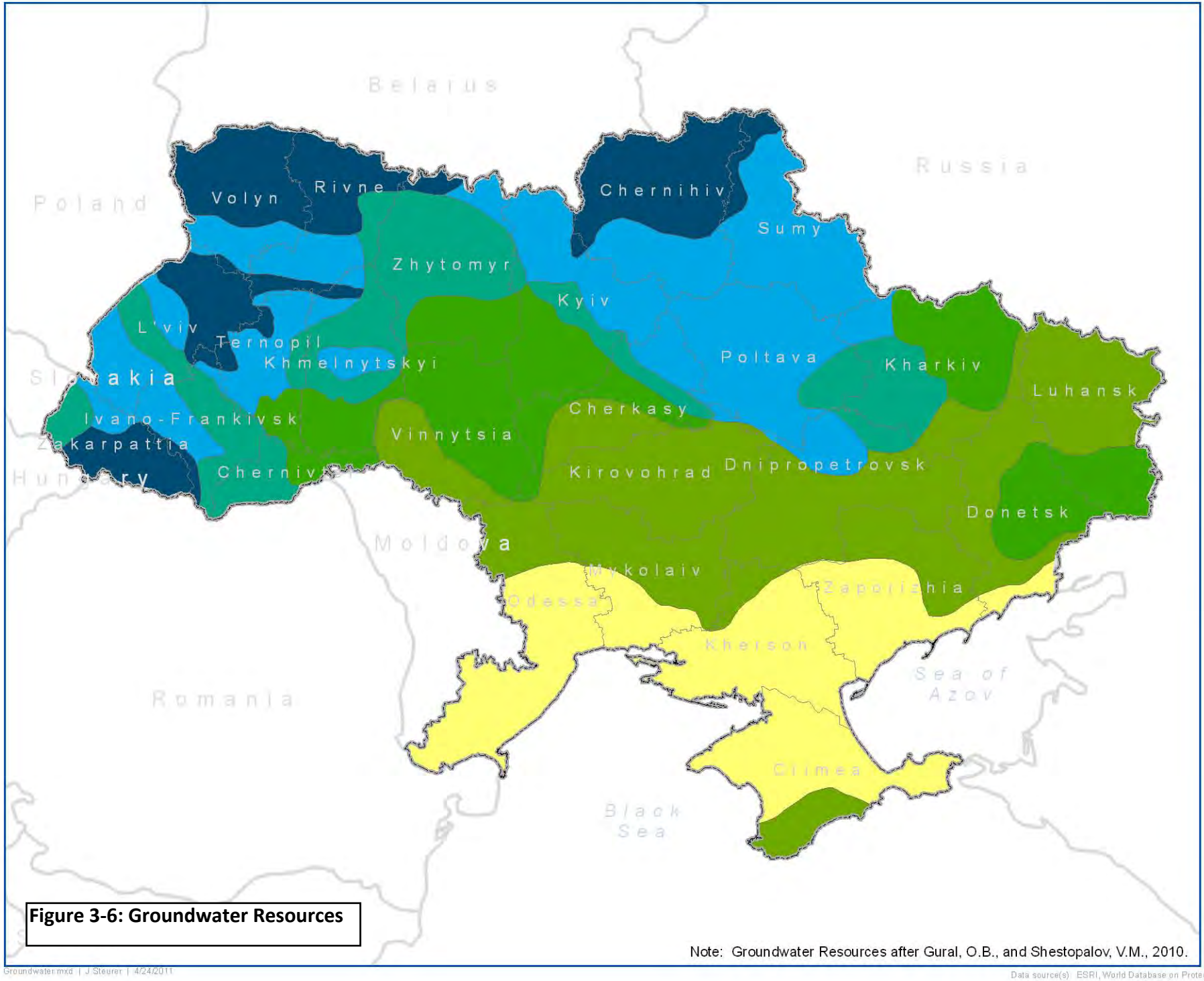

Figure 3-6: Groundwater Resources

Note: Groundwater Resources after Gural, O.B., and Shestopalov, V.M., 2010.

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Groundwater Resources

Legend

Groundwater Resources (l/s per km^2)

- Less than 0.5
- 0.5 - 1.0
- 1.1 - 2.0
- 2.1 - 3.0
- 3.1 - 5.0
- Over 5.0

Data Sources: National Atlas of Ukraine; ArcWorld Supplement

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0 50 100
Kilometers

1 cm = 60 km

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Groundwater.mxd | J.Steurer | 4/24/2011

Data source(s): ESRI, World Database on Protected Places, CIAT-CSI (http://srtm.csi.cgiar.org), PVGIS

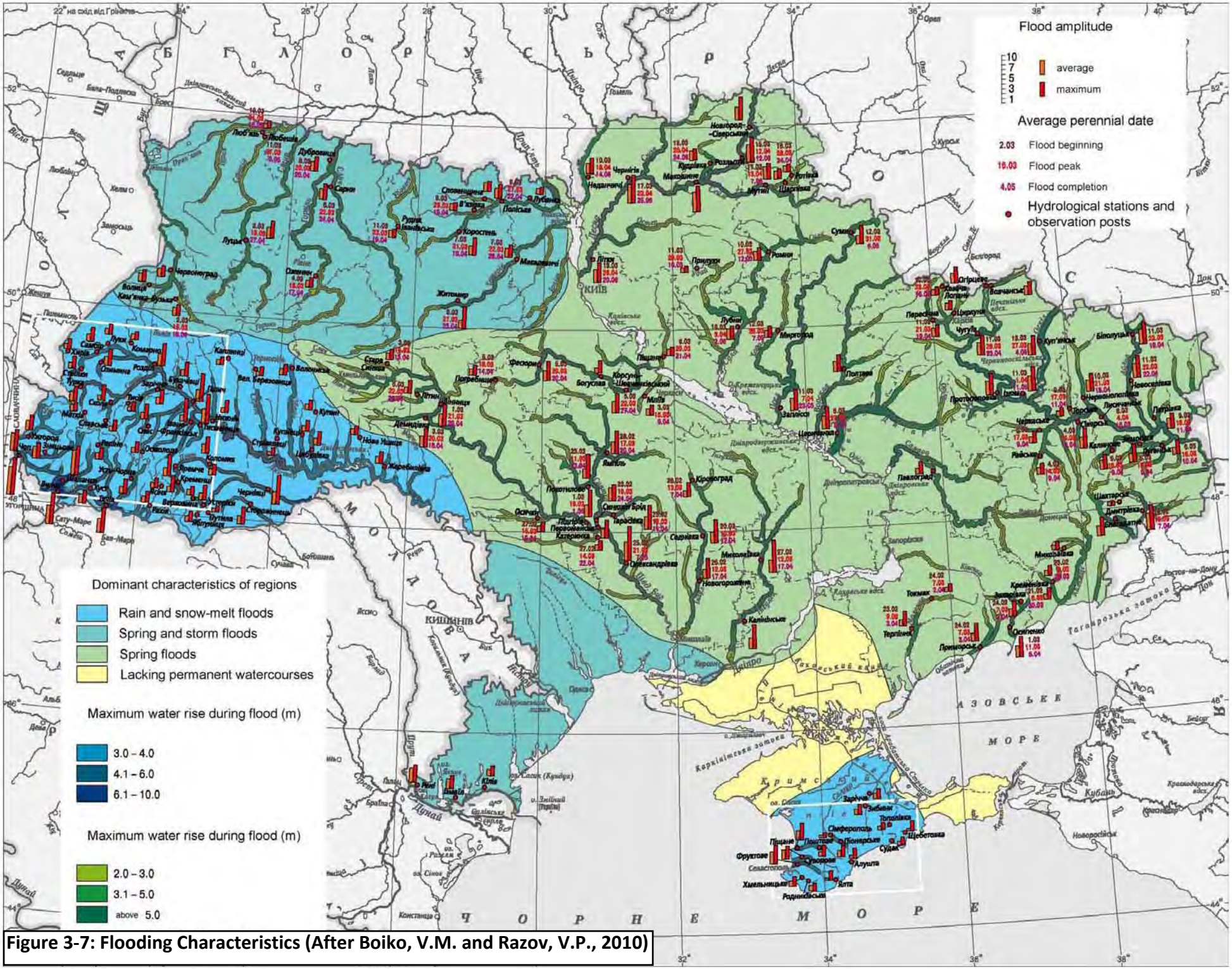
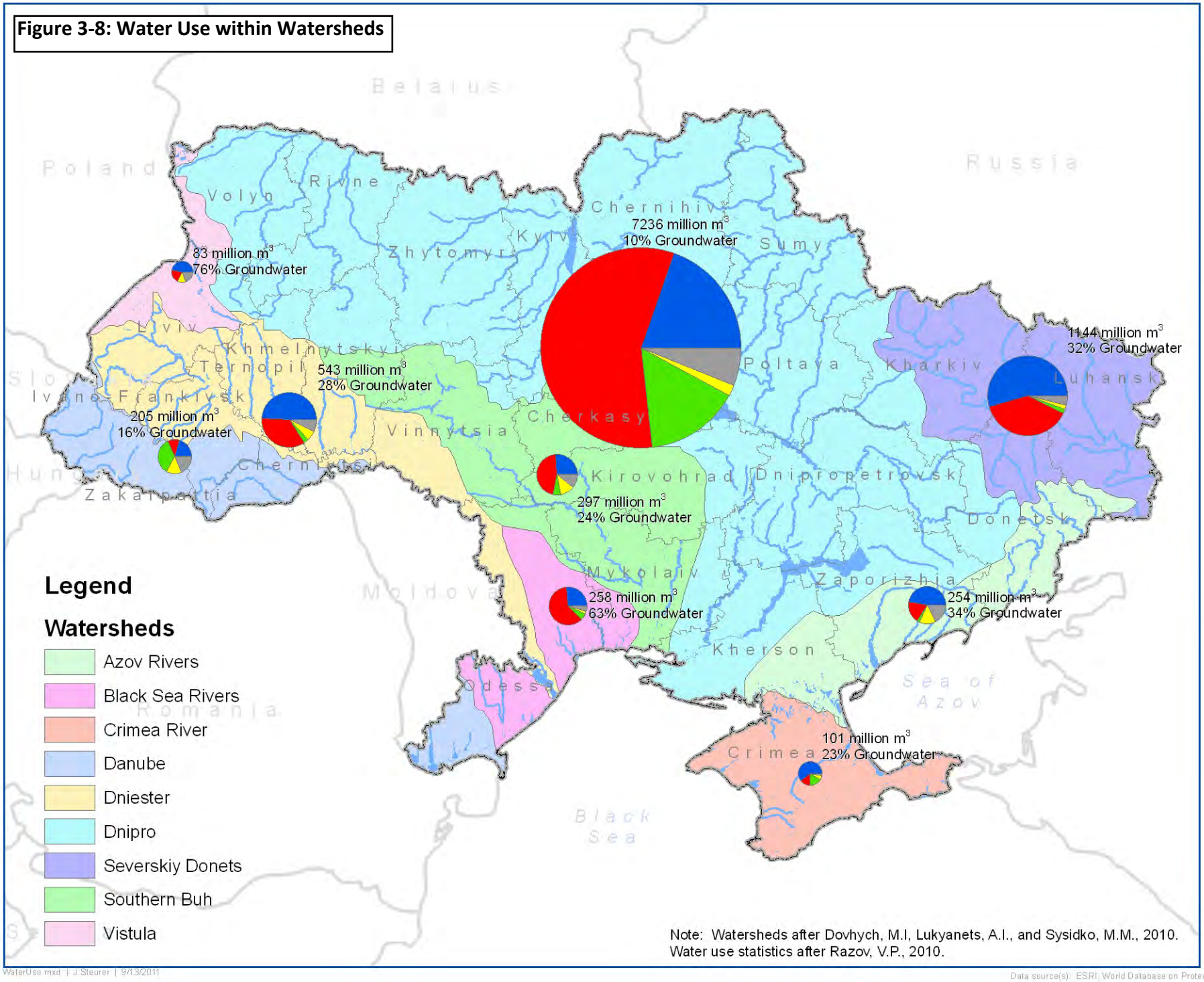


Figure 3-7: Flooding Characteristics (After Boiko, V.M. and Razov, V.P., 2010)

Figure 3-8: Water Use within Watersheds



Note: Watersheds after Dovhych, M.I, Lukyanets, A.I., and Sysidko, M.M., 2010.
Water use statistics after Razov, V.P., 2010.

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Water Use within Watersheds 2003

Legend

Water Use (million m^3)

- Drinking
- Production
- Irrigation
- Agriculture
- Other

Data Sources: National Atlas of Ukraine; DeLorme; ArcWorld Supplement

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Kilometers

1 cm = 60 km

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WaterUse.mxd | J.Steurer | 9/13/2011

Data source(s): ESRI, World Database on Protected Places, CIAT-CSI (http://srtm.csi.cgiar.org), PVGIS

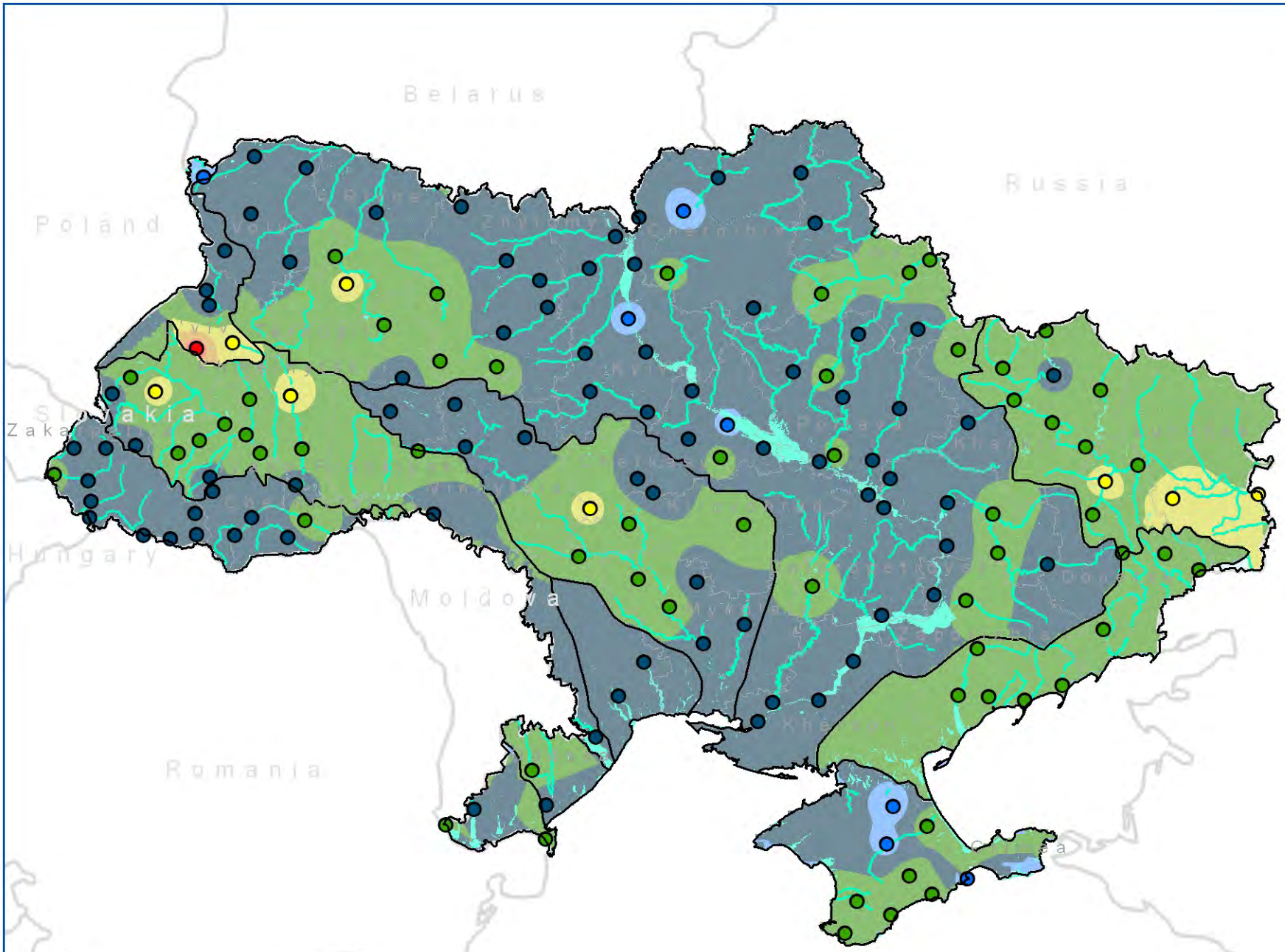

Figure 3-9: Surface Water Quality – Saprotropic Biologic Indicator

Note: Water quality data from Manchenko, A.P., Nabyvanets, Y.B., Osadchaya, N.M. et al., 2010

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Surface Water Quality Saprotropic Biologic Indicator

Legend

Water Quality Category

- 1 Excellent
- 2 Very good
- 3 Good
- 4 Satisfactory
- 5 Mediocre
- 6 Poor
- 7 Very poor

Data Sources: ArcWorld Supplement; Michael Bauer Research GmbH, EuroGeographics; National Atlas of Ukraine

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0 50 100
Kilometers

1 cm = 60 km

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WaterQuality_Bio.mxd | J.Steurer | 4/24/2011

Data source(s): ESRI, World Database on Protected Places, CIAT-CSI (http://srtm.csi.cgiar.org), PVGIS

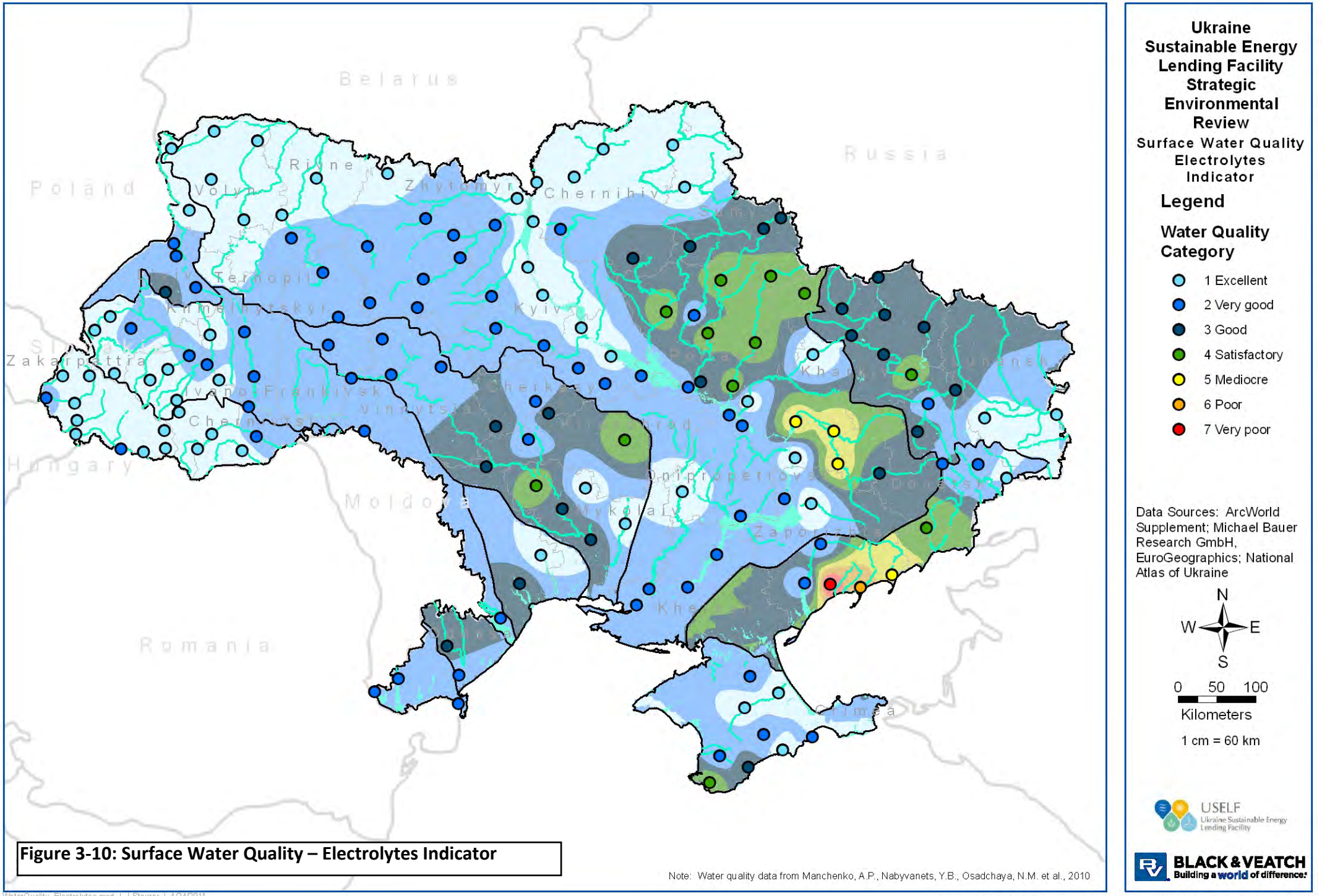

Figure 3-10: Surface Water Quality – Electrolytes Indicator

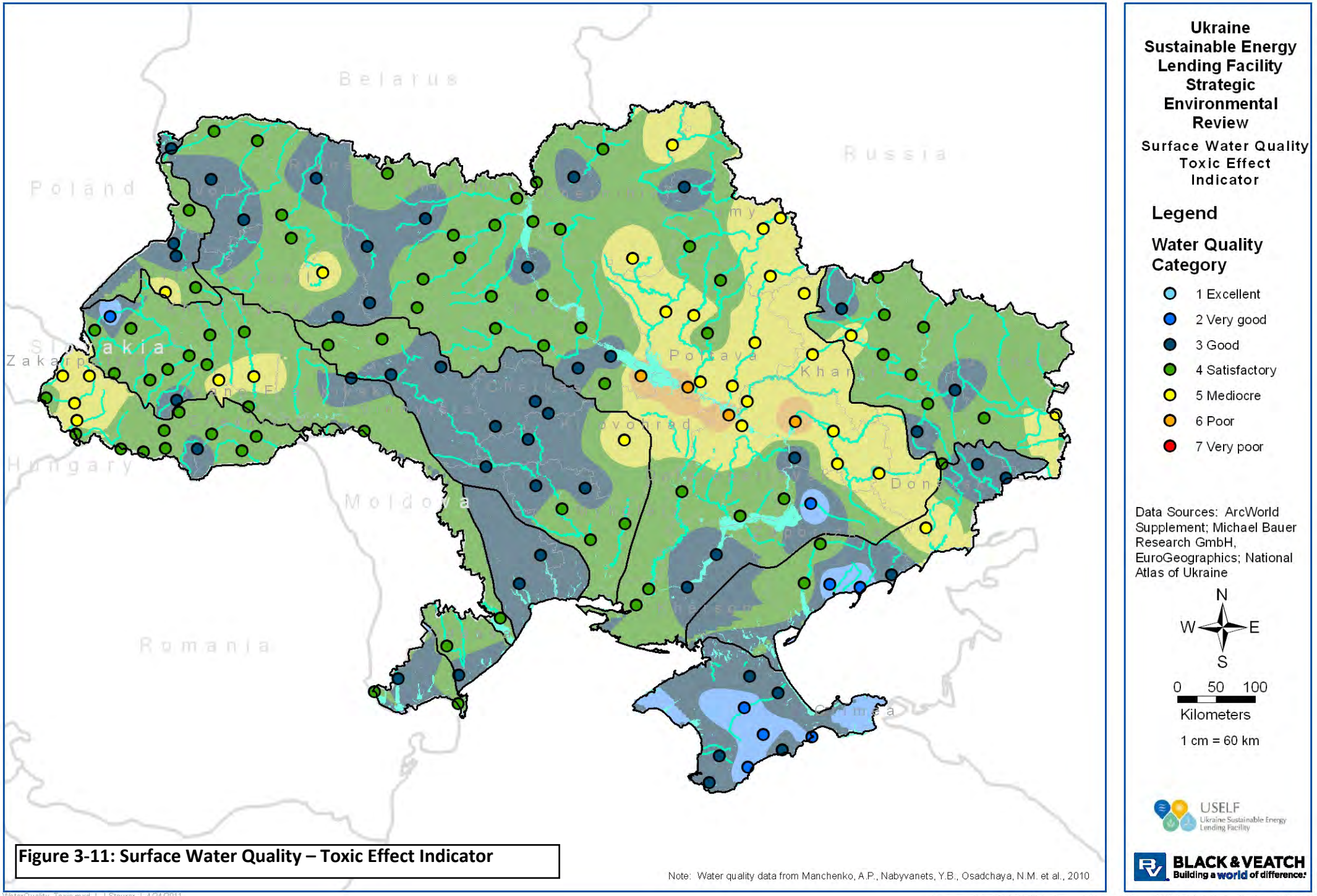

Figure 3-11: Surface Water Quality – Toxic Effect Indicator

Note: Water quality data from Manchenko, A.P., Nabyvanets, Y.B., Osadchaya, N.M. et al., 2010

WaterQuality_Toxic.mxd | J.Steurer | 4/24/2011

Data source(s): ESRI, World Database on Protected Places, CIAT-CSI (http://srtm.csi.cgiar.org), PVGIS

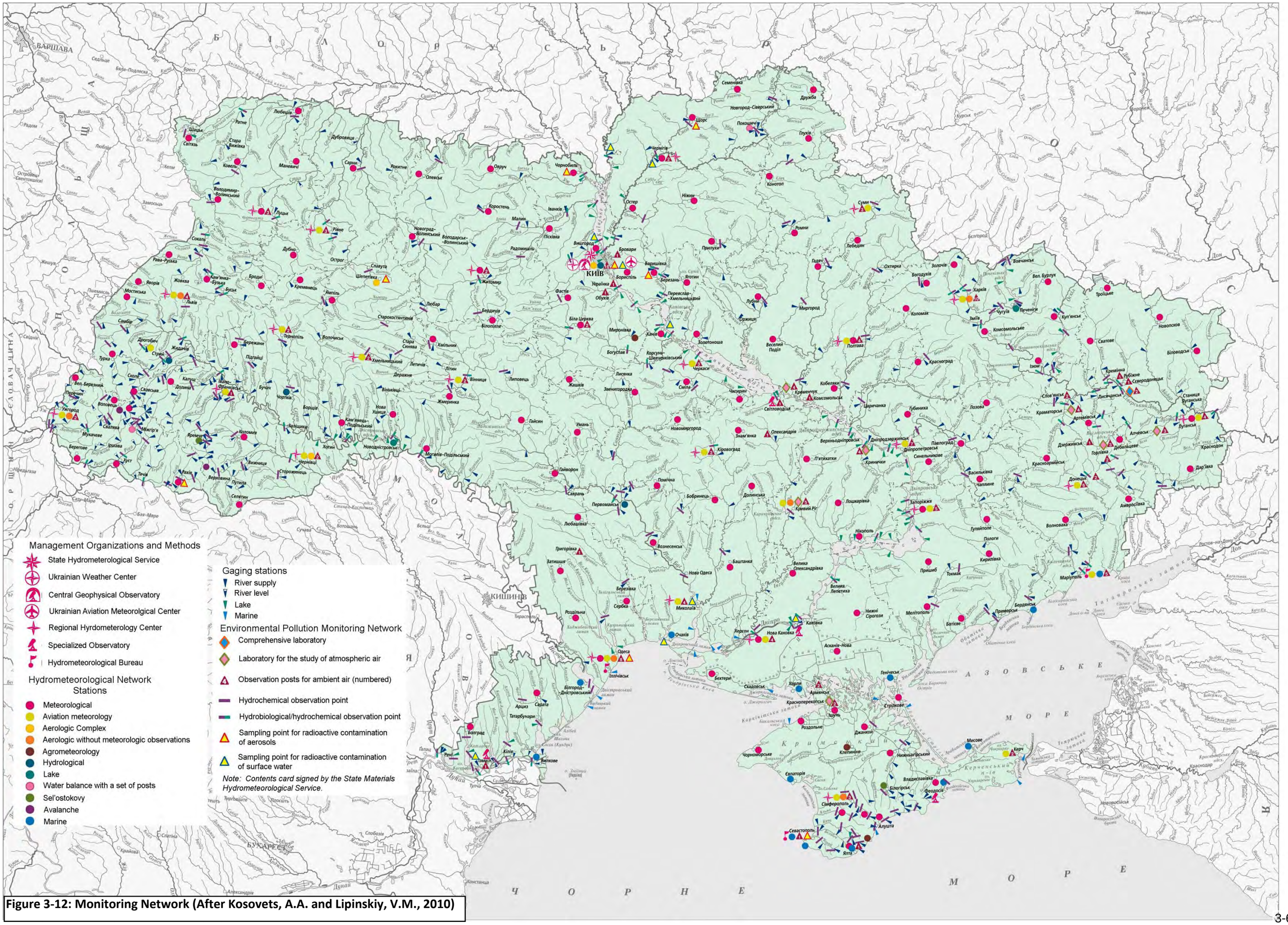

Figure 3-12: Monitoring Network (After Kosovets, A.A. and Lipinskiy, V.M., 2010)