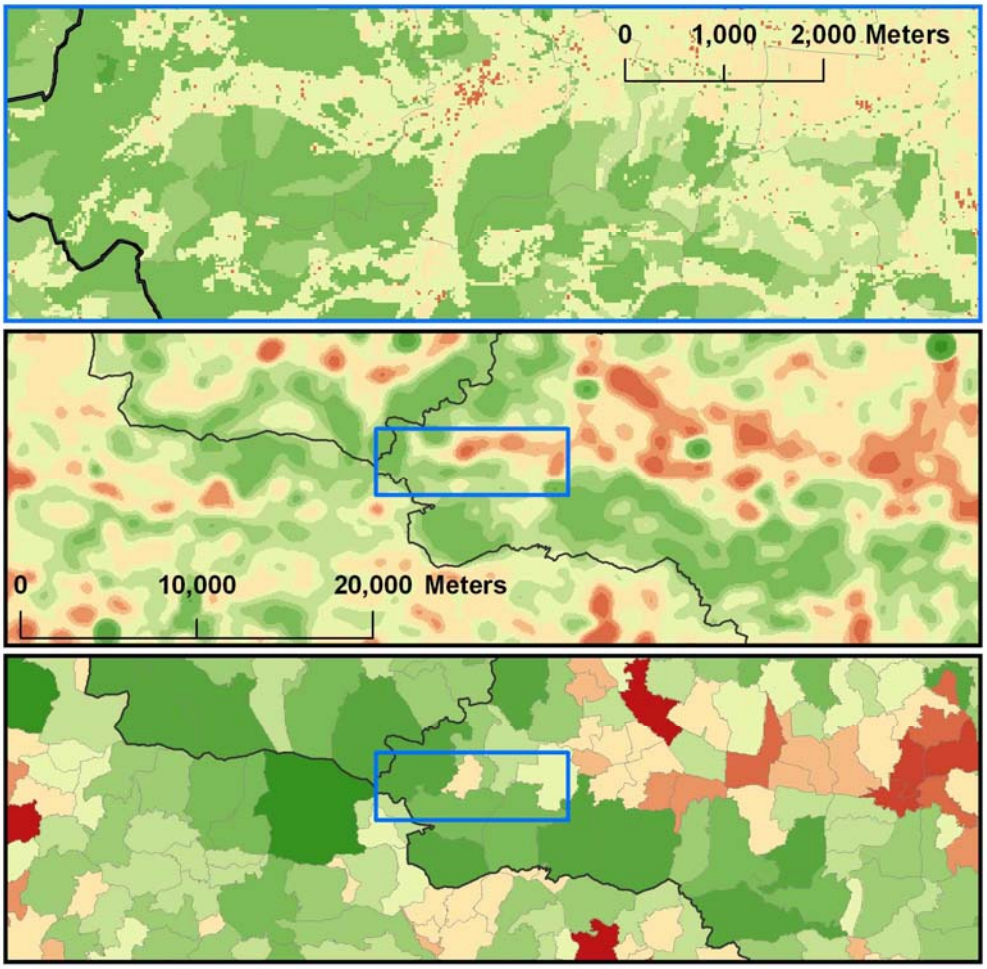
IEE Project MAKE-IT-BE

Work Package 4: Development of supporting tools for bioenergy initiatives

Upgraded WISDOM Slovenia as supporting tool for bio-energy initiatives



Rudi Drigo, International WISDOM Specialist

Activity carried out for the Slovenia Forest Service in context of IEE Project MAKE-IT-BE (WP4), under the supervision of **Jurij Begus** and with contributions from **Rok Pisek** and **Andrej Grum**.

June 2011

Contents

1. Introduction

The upgrade and update of WISDOM Slovenia is carried out in the framework of the IEE Project MAKE-IT-BE, with specific reference to the scope of the Work Package 4: Development of supporting tools for bioenergy initiatives.

This WP focuses on the development of tools and methodologies to support decision-making and implementation of bio-energy chains.

Slovenia's supply and demand of woodfuels has been analyzed in 2004-2005 with FAO assistance (Drigo R. and Ž. Veselič. 2006) through the application of the Woodfuel Integrated supply/demand Overview Mapping methodology (Drigo et al, 2002; Masera et al. 2003). The geostatistical database produced at that time provided the first outlook of the wood energy sector and its potential in Slovenia. The analysis was carried out at the most detailed administrative unit level (Kadastral Obcina). In the meanwhile, the WISDOM method has been applied in many other countries and further developed to include other non-woody biomass sources as well as more advanced spatial analysis procedures. Concerning the latter, particularly relevant is the cell-level analysis in a raster mapping environment (rather than vector-based administrative level) which supports for the analysis of resource accessibility and the delineation of sustainable biomass supply zones (woodshed analysis) (Drigo and Salbitano, 2008).

At the same time, most of Slovenia reference data used in the first WISDOM analysis, such as land use maps and forestry data have been revised and updated. Similarly, new surveys were carried out concerning the production of wood residues by wood processing industries and more in general on the production of biomass residues by all industrial sectors and their destiny.

1.1 Objectives

Given the purpose of Make-It-Be's WP4, the scope of this activity is to support bioenergy decision-making processes in Slovenia by establishing an update and reliable geo-statistical information system on current use of biomass for energy and its sustainable potential for forward-looking bioenergy initiatives.

Given the character of Slovenia in respect of biomass supply, which is dominated by woody biomass from the rich forest resources and wood industries, and in order to optimize the complementarities with other concomitant IEE Projects (i.e. BIOENERGIS; __), the main attention was given to woody biomass, its decision-making process on bioenergy and competing uses.

In this context, the specific objective of this activity was to upgrade and update the WISDOM Slovenia geo-database to include new reference data, to develop the spatial analysis component , and to allow woodshed analyses, while the analysis of non-woody biomass sources was limited to crop residues at harvesting sites.

The information that could contribute to the update and upgrade of the WISDOM geodatabase in Slovenia was found to be extremely rich in both thematic and geographic resolution. This wealth of data imposed a moral obligation to its use and, inevitably, to the considerable amount of work necessary to its procurement, processing, harmonization, etc. A direct consequence of this larger-than-expected data processing phase and of the increased ambition of analysis is that the time originally allocated to the task resulted too short and a subsequent consolidation phase is recommended for the analysis of bioenergy scenarios under various perspectives and for the identification/discussion of the most promising bio-business options and locations.

Scope of this report is to describe in detail the features of the WISDOM methodology, to document the analytical procedures followed, to present and discussed the results achieved so far and to identify/recommend the necessary follow-up action.

2. Upgrade and update of WISDOM Slovenia

2.1 Rationale and features of the WISDOM approach

2.1.1 Diagnostic

The experience clearly shows that the information on the current consumption and on the potential supply of biomass for energy is incomplete and often misleading in most countries, and European countries make no exception. In this context, a thorough diagnostic of the situation is an essential prerequisite to the formulation of sound bioenergy strategies and policies and to any level of bioenergy planning.

In most countries the information about production and consumption of biofuels is fragmented, incomplete and almost systematically underestimating the actual production and consumption levels.

Concerning woodfuels, this is due in good part to the fact that the production of fuelwood and, to a lower extent, of charcoal are mostly informal and thus escape the recording procedures that represent the sources of official national statistics. Moreover, a more or less significant share of fuelwood comes from non-forest sources, provenience that goes almost entirely unrecorded. From the consumption side, the situation is slightly better since the estimates are usually more accurate than for production (e.g. Slovenia) because they are produced through national energy surveys or censuses and not as a collection of administrative records, as in case of forest products. The frequent result is that, within a given country, fuelwood production statistics (plus import and minus export) do not match fuelwood consumption statistics, which may be extremely confusing. In practice, existing wood energy information must be carefully evaluated by cross-referencing consumption and production data. It is in fact impossible to formulate sound policies and to undertake efficient planning if the production/consumption context is undetermined or grossly unreliable.

Concerning agrofuels, crop statistics are usually available by medium-large administrative units and it's difficult to define their location at local level. Moreover, farming may be extremely dynamic and crop data shows substantial inter-annual variability, which makes the estimation of available residues rapidly out-of-date.

The development of modern bio-energy systems requires reliable estimates of the resource potential, which cannot be determined without understanding current practices and estimating with acceptable precision the surplus (sustainable production potential <minus> current consumption) actually available for new bioenergy initiatives.

In view of the erratic character of bio-energy information generally available it is necessary to keep a flexible analytical approach, adapted as far as possible to information and parameters actually available, in order to value existing knowledge and to maintain the ambition of analysis within realistic terms. A rigid model structure requiring fixed input parameters would inevitably remain very general (or incomplete for lack of input data) and thus missing the heterogeneous information locally available. On the contrary, in a more flexible context the priorities (concerning information needs and planning focus) are determined case by case, which will allow identifying critical information gaps and planning effective data collection programs.

Moreover, bioenergy systems are location-specific. The spatial patterns of biofuel production and consumption, and their associated social, economic and environmental impacts, are site specific. Broad generalizations about the biofuel situation within a country may bring to misleading conclusions, poor planning and ineffective implementation. Consequently, supply and demand of biomass for energy must be analyzed in a GIS environment.

2.1.2 Outline of analytical process

Three main phases of analysis may be identified:

1 - WISDOM Base. This covers the diagnostic of biomass supply and demand and produces a georeferenced analysis over the entire Slovenia territory.

2 –Woodshed analysis / preliminary biodistrict delineation. This phase of analysis uses the result of the WISDOM Base to delineate the areas with high bioenergy potential and the sustainable supply zone of selected consumption sites such as selected settlements or existing/planned biomass plants.

3 - Bioenergy scenarios development. This detailed analysis will be carried out in the locations selected on the basis of the diagnostic and priority zoning. The alternative bioenergy options will be based on the following aspects.

- Energy demand scenarios
- Economic analysis
- Environmental impact analysis (lifecycle emission analysis)
- Energy conversion technologies

2.1.3 WISDOM features:

- **Geo-referenced data bases**. A core feature of the approach is the spatial base on which the data is framed. The analysis and presentation of results for all modules is done with the help of a Geographic Information System (GIS).
- **Minimum administrative and spatial units of analysis.** The spatial resolution is defined at the beginning of the study, on the basis of the desired level of detail (national study, regional study) and as constrained by the main parameters or proxy variables that will be used to “spatialize” the information. In most cases the basis for the definition of the administrative level of analysis is provided by the existing demographic data (i.e. census units), which represents the most detailed sub-national structure of a country. The spatial level of analysis (i.e. the size of the pixel in GIS raster data) is usually determined by the mapping detail of the available land use/land cover data.
- **Modular and open structure**. WISDOM consists of modules on demand, supply, integration and woodshed analysis. Each module requires different competencies and data sources and its contents is determined by the data available or, to a limited extent, by the data purposively collected to fill critical data gaps. Once the common spatial base of reporting is defined, each module is developed in total autonomy using existing information and analytical tools and is directed to the collection, harmonization, cross-referencing and geo-referencing of relevant existing information for the area of study.
- **Adaptable framework**. As mentioned previously, the information of relevance to wood energy comes from multiple sources , ranging from census data to local pilot studies or surveys, to projected estimates with unknown sources, and is often fragmented and poorly documented. Proxy variables may be used to “spatialize” discontinuous values. In synthesis, WISDOM tries to make all existing knowledge work for a better understanding of biomass consumption and supply patterns.

Comprehensive coverage of woody and non-woody biomass resources and demand from different users. The analytical framework includes of all sources of biomass potentially available for energy (i.e. fuelwood and charcoal, crop residues, industrial residues, etc.) and all users categories (rural and urban residential; industrial; commercial and public).

The WISDOM methodology covers the first two phases of the proposed methodology for Slovenia and will create the analytical basis for the third phase (bioenergy scenario development).

WISDOM's specific steps of analysis are summarized below while a graphic overview is shown in Figure 1. The detailed description of the data used and analysis conducted in each step is given in the following Sections.

WISDOM Base

The application of the standard WISDOM analysis producing supply and demand balance mapping at the local level involves five main steps (FAO, 2003b).

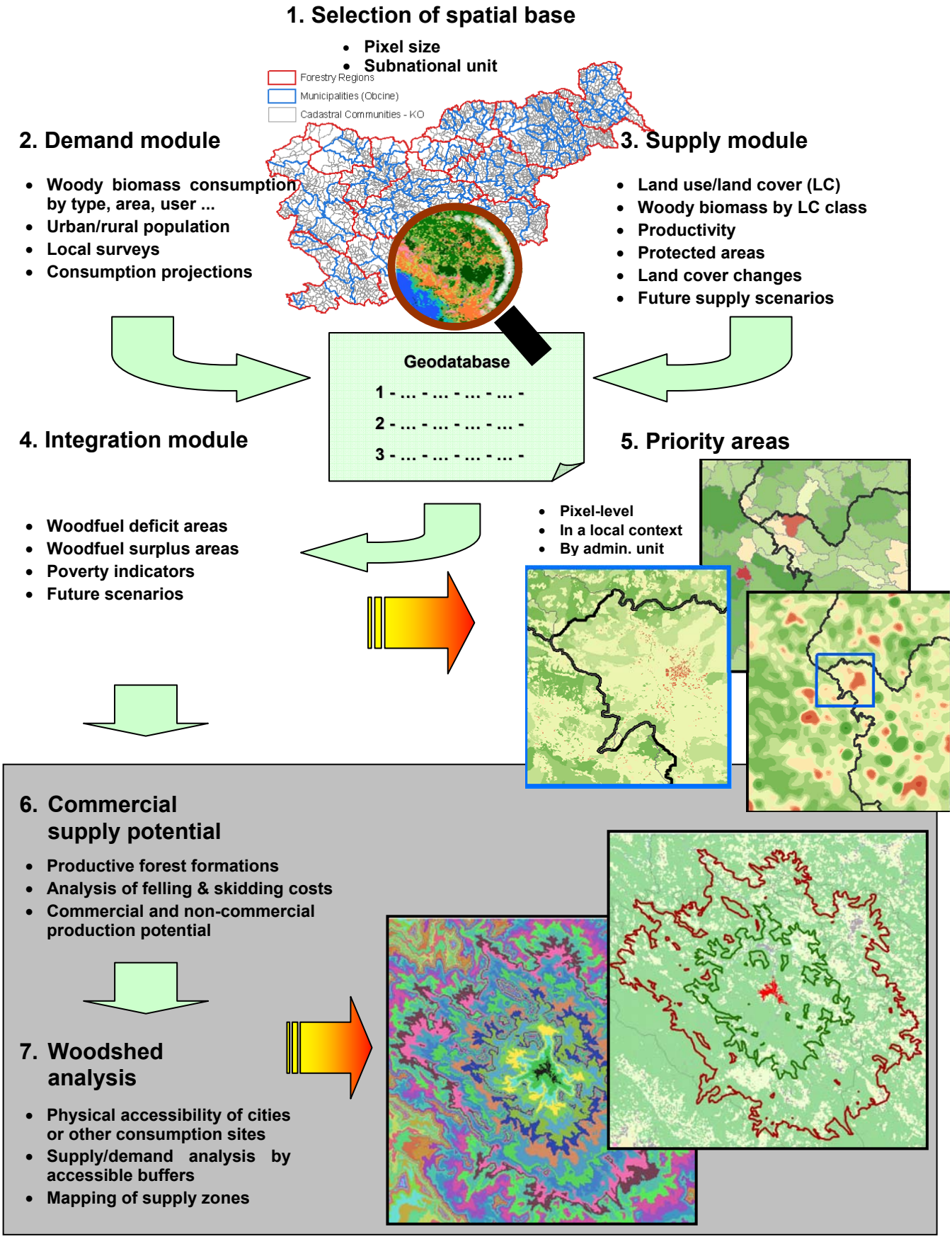
1. Definition of the minimum administrative *spatial* unit of analysis.
2. Development of the *demand* module.
3. Development of the *supply* module.
4. Development of the *integration* module.
5. Selection of the *priority* areas under different perspectives.

Woodshed analysis and preliminary biodistrict delineation

The analysis for the delineation of woodsheds, i.e. supply zones of specific consumption sites requires additional analytical steps that may be summarized as follows.

6. Mapping of potential "commercial" biomass supply suitable for bioenergy generation.
7. Woodshed analysis, or potential sustainable supply zones of selected consumption sites, and/or preliminary definition of biodistricts based on biomass production potentials and physical accessibility parameters.These zones are termed "woodsheds" in analogy with the familiar geographical concept of *water*sheds. The woodshed of a given consumption site may be defined as the minimum area around the site in which the cumulative woodfuel balance between the deficit areas and the "commercial" surplus areas is non-negative.

Figure 1: WISDOM analytical steps. WISDOM Base (steps 1 to 5) and Woodshed analysis or preliminary biodistrict delineation (steps 6 and 7).



2.2 Upgrade and update of WISDOM Slovenia

2.2.1 Thematic upgrade

In the previous WISDOM study over Slovenia (Drigo and Veselič, 2006) the analysis concentrated on the supply potential and current consumption of the woody biomass from all sources (forests, farmlands, woody crops, industries, etc.). In this new phase the analysis will expand the scope of the analysis to integrate the non-woody biomass from crop residues at harvesting sites. Table 1 proposes a scheme of classification of the most common sources of biomass potentially available for energy use (UBET, FAO 2004).

Table 1: Classification of Biomass sources by different characteristics (adapted from UBET, FAO 2004)

<table>
<tr><th></th><th></th><th>woody biomass</th><th>herbaceous biomass</th><th>biomass from fruits and seeds</th><th>others (including mixtures)</th></tr>
<tr><td rowspan="2">Energy crop</td><td></td><td>WOODFUELS</td><td colspan="2">AGROFUELS</td><td></td></tr>
<tr><td>direct</td><td>- energy forest trees (coppice forests)
- energy plantation trees</td><td>- energy grass
- energy whole cereal crops</td><td>- energy grain</td><td></td></tr>
<tr><td rowspan="2">By-products*</td><td rowspan="2"></td><td rowspan="2">- thinning by-products
- logging by-products
- landscape management by-products</td><td colspan="2">Crop production by-products:</td><td rowspan="2">- animal by-products
- horticultural by-products</td></tr>
<tr><td>- straw</td><td>- stones, shells, husks</td></tr>
<tr><td></td><td>indirect</td><td>- wood processing industry by-products
- black liquor</td><td>- fibre crop processing by-products</td><td>- food processing industry by-products</td><td>- biosludge
- slaughterhouse by-products</td></tr>
<tr><td>End use materials</td><td>recovered</td><td>- used wood</td><td>- used fibre products</td><td>- used products of fruits and seeds</td><td>Municipal by-products
- kitchen waste
- sewage sludge</td></tr>
</table>

*The term "by-products" includes the improperly called solid, liquid and gaseous residues and wastes derived from biomass processing activities.

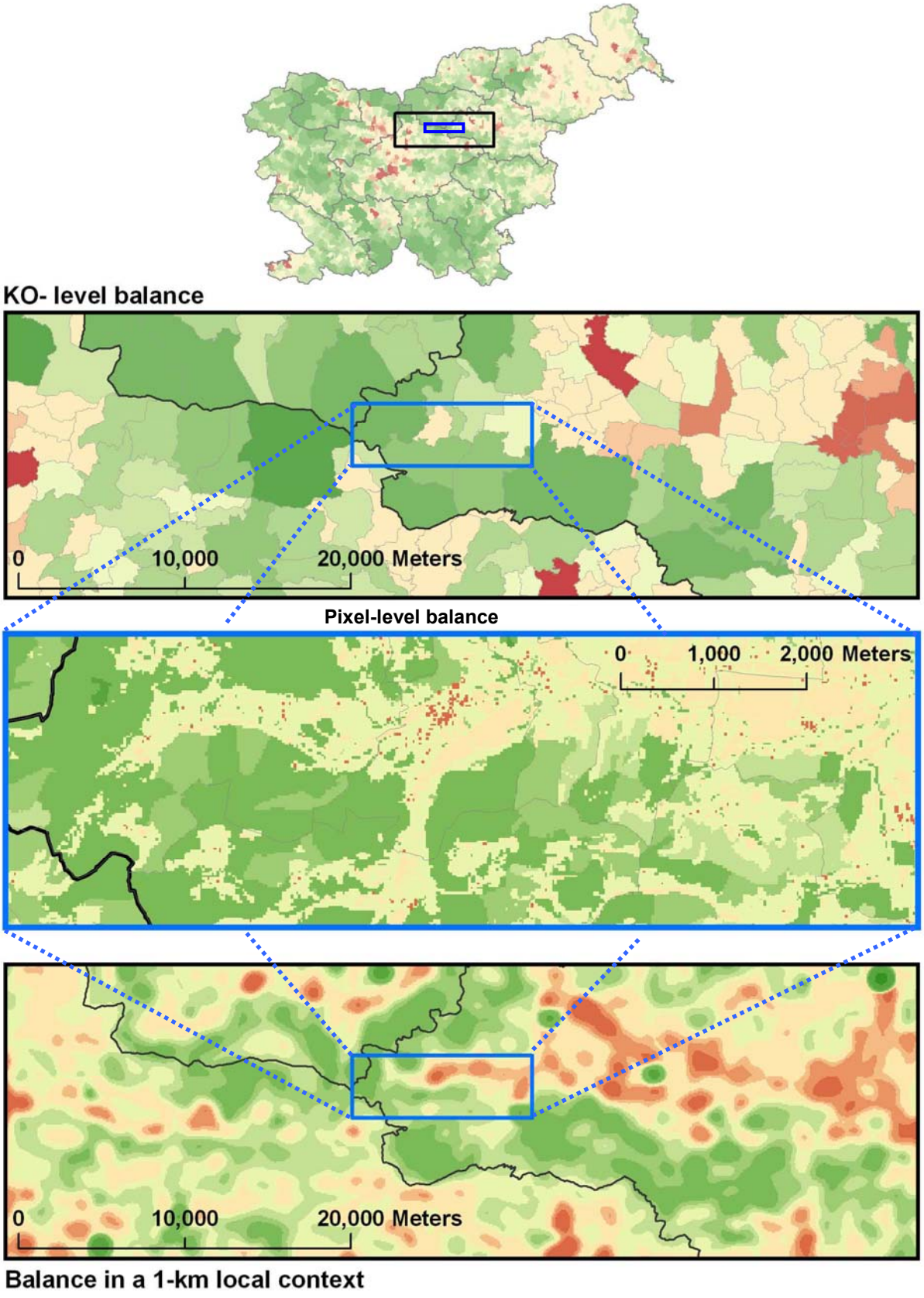
2.2.2 GIS/spatial analysis upgrade

The previous WISDOM analysis was carried out on vector data at the level of Kadastral Obcina (KO) which is the lowest administrative level, with some 3000 units. The present analysis is carried out on high-resolution raster data. The chosen cell size of 25m (16 cells covering 1 hectare) was determined by the great level of detail of the new Slovenia Land Cover Map, which is the basis on which the whole analytical structure is built. The 25m raster data supports a very high spatial detail of analysis, which will make the information adequate for local operational planning level and not only for strategic planning.

The map abstracts shown in Figure 2 allow for a visual appreciation of the distinct scales of analysis.

The analysis will be carried out on raster data at full resolution but the administrative levels (KO, Counties, Forest Regions, etc.) will be maintained for aggregation of pixel-level results for reporting purposes.

Figure 2: Examples of the new spatial resolution of analysis.. The map abstracts show the woodfuel supply/demand balance at different scales of analysis: at Kadastral Obcina (KO) level, at individual 25m pixel-level and in a 1-km local context. In all maps the red areas indicate deficit conditions and green areas surplus conditions.



2.2.3 Analytical upgrade

Woodshed analysis. The updated and spatialized information of the WISDOM Base will provide the elements for the definition and geographic delineation of sustainable supply zones for existing and hypothetical consumption sites.

In turn, the woodshed analysis will be essential for the development of bioenergy scenarios in which the potentially available surplus resources are analyzed in respect of energy demand and plant dimensions, extraction costs and economic accessibility, physical accessibility and transport, etc..

3. Analytical procedures and results

The development of the WISDOM modules and the products/results produced are described the following sections.

The specifics of the necessary parameters/variables, their sources and procurement approaches, the processing and mapping procedures and other details are presented in Annex 2 “Main layers, variables and data sources of WISDOM modules. This comprehensive table constitutes the “WISDOM road map” and represents the main reference in the development of the modules.

The names and synthetic description of the maps used as reference and resulting from the elaboration of Supply, Demand, Integration modules are given in Annex 8.

3.1 Selection of spatial base

Given the very high resolution of the new Slovenia Land Cover Map, which is the base map supporting the whole analysis, the selected spatial resolution of analysis of raster data is 25m (16 cells covering 1 hectare). As mentioned in the previous section, this is a very high spatial resolution that may support operational planning (see Figure 2 above).

Reporting units

Once the analysis of woodfuel supply, demand, balance, etc. is done at pixel level, the results may be summarized for reporting reasons at any chosen administrative level.

For the scope of this report two main levels are selected:

Forest regions (14 units) : This subdivision is used in the main text to summarize the results of the analysis for the most relevant parameters. The list of Forest Regions is given in Table 2 and the map is shown in Figure 3. The cartographic references are: vectors: file comp2009 in gdb comp09_d (field REG); Slo_ggo_region.shp; raster: for_reg_ggo.

Counties [Obcinas] (210 units): This subdivision is used in Annex _ to summarize the results of the analysis for the most relevant parameters. See Annex 12 for the list of Counties. The cartographic references are: vectors: OB.shp; raster: OB_ID.

Table 2: Forest regions

Code	Forest Region	25m pixels	km2
1	**Tolmin**	3,567,048	2,229.4
2	**Bled**	1,625,096	1,015.7
3	**Kranj**	1,722,249	1,076.4
4	**Ljubljana**	4,005,812	2,503.6
5	**Postojna**	1,717,435	1,073.4
6	**Kočevje**	1,887,907	1,179.9
7	**Novo mesto**	2,435,813	1,522.4
8	**Brežice**	2,174,202	1,358.9
9	**Celje**	2,473,205	1,545.8
10	**Nazarje**	1,105,850	691.2
11	**Slovenj Gradec**	1,422,325	889.0
12	**Maribor**	3,716,941	2,323.1
13	**Murska Sobota**	2,138,343	1,336.5
14	**Sežana**	2,439,669	1,524.8
Tot			**20,270**

Figure 3: Forest Regions and municipalities

3.2 Supply Module

The structure of the sections of the Supply module follows the scheme presented in table 1 above.

3.2.1 Direct sources

3.2.1.1 Definition of woody biomass supply potentials

The definition of the direct supply potential is relatively complex since it requires a sequence of analytical steps and progressive refinements. The various categories of biomass productivity that constitute the woody biomass potentially available for bioenergy from direct sources are graphically represented in Figure 4 and described in the following paragraphs:

Total biomass stock / dendromass stock: These are important parameters that can be estimated from inventory data since all inventories report on volume stock by formation, geographic area, etc.. Volume data is also the basis for the estimation of aboveground biomass and eventually on total living plant biomass. The *dendromass* stock includes the woody component of the aboveground biomass less stump and twigs. The stock parameters are precious for all carbon-related analyses and may serve as reference for the definition of the economic suitability of supply sources at harvesting time. ***(biomass_stk-, d_mass_stk)***

Total sustainable dendromass productivity: This defines the biological sustainable capacity to produce woody biomass in current land cover/land use conditions. It refers to the dendromass and thus it doesn't include leaves, twigs and roots but includes all species, and vegetation formations and land cover/uses. This category is mainly theoretical as it includes inaccessible resources as well as products that pertain to other uses and/or industrial processes. ***(d_mass_mai)***

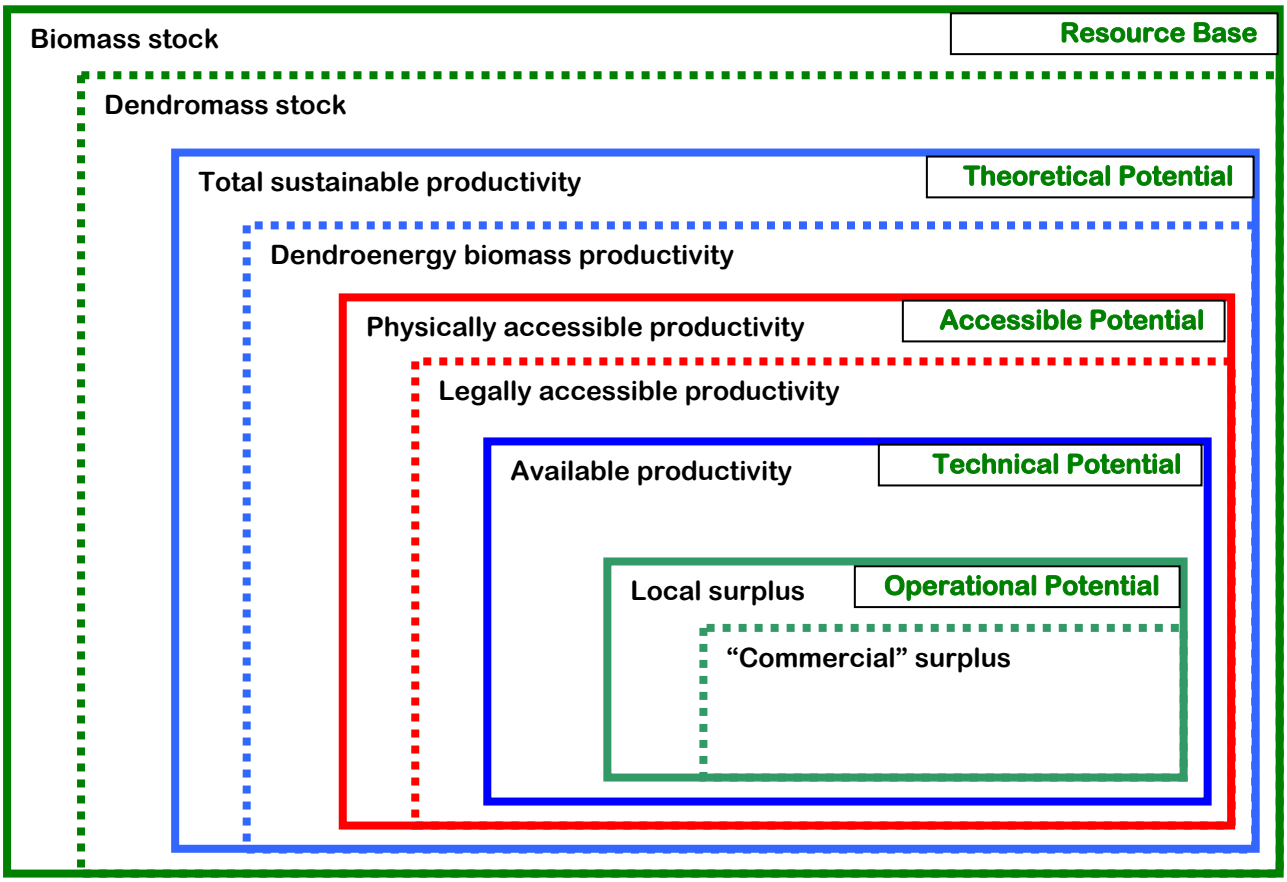
Dendroenergy biomass productivity: This category refers to the fraction of total sustainable productivity that is of no interest for the timber industry in terms of species and assortments and that is not implicitly intended to other purposes. From this productivity are excluded the stems of the precious/commercial species. In addition to the woody biomass from other non-precious species, the non-industrial biomass productivity does include the branches as well as the defective stems of the precious species since they have no use in timber industries. Usually, the industrial wood is deducted, as a fraction, only from the forest classes where industrial exploitation may be implemented. This category is not for energy use only but it includes assortments and species that are suitable for other industrial uses, such as particle board and fiber board industries. ***(d_e_mai)***

Physically accessible productivity: This category defines the fraction of the total non-industrial biomass productivity that may be considered accessible, after deduction of the areas and fractions of productivity that are inaccessible due to physical constraints (i.e., slope, distance from roads and populated places, crossing resistance of land cover classes).

Legally accessible productivity: This category defines the fraction of the above category that has no legal constraints to the sustainable exploitation. Depending on restrictions specifications, protected areas are the main categories here represented. In general, strict nature protection areas are to be excluded completely from the potential supply. More complex is the situation with the less restrictive protection categories, for which the restriction may cover only part of the area or some seasonal periods. In the European countries, for instance, several different protection categories may overlap over the same portion of land, none of which totally precluding sustainable management and exploitation of the biomass resource.

Forest management restrictions and prescriptions impose legal limitations to the exploitation of the physiologic increment under a variety of silvicultural considerations. The Annual Allowable Cut is usually conservative and represents in this cases the legally accessible productivity. ***(d_mass_acut)***

Figure 4: Biomass productivity and supply potential



Available productivity: This category defines the fraction of the accessible non-industrial productivity that remains available for energy uses after deduction of the amounts annually consumed for other purposes. In this context, the entire "non-timber" resource, which exclude the stems of better quality suitable for sawn wood assortments, but includes the potential feedstock for energy as well as fiber, particles, mechanical pulp and tannin industries, is the first category to be defined. ***(d_e_acut)***

The fraction of the non-timber productivity suitable as feedstock material suitable for particle and fiber boards industries, for mechanical pulp and tannin industries must be defined and mapped as well. This allows comparing these potentially available assortments to the actual amounts used by the industries and thus defining the real level of competition between energy and other industrial processes for the same potential feedstock potential.

Once deducted the other uses, the remaining resource is potentially available for energy use. This represents the "technical" supply potential to be considered for the estimation of local supply/demand balance. In the rural areas of developing countries and, to some extent, of industrialized countries, the local demand is met by local fuelwood production chains or informal channels such as gathering of fuelwood in own farmland or in surrounding forests and woodlands.

Local surplus It is defined as the fraction of the available productivity that exceeds the local demand. The local surplus is estimated and mapped through the supply/demand balance analysis, whereby the available productivity and the local demand are combined to define the deficit areas (where the available productivity is insufficient to meet the local demand) and the surplus areas (where it exceeds the local demand). The local surplus actually defines the operational potential, i.e. the resource potentially available for formal bioenergy initiatives.

"Commercial" surplus/productivity: This category defines the fraction of the local surplus which may be suitable to sustain commercial fuelwood and charcoal production to feed woodfuel markets, biomass plants and export. It is limited to the vegetation formations and other supply sources that justify extraction costs.

The definition of the supply categories described above and the procedures to assess them in the specific Slovenia context are described hereafter.

3.2.1.2 Forestry

Source data for the forestry sector is the rich database of Forest Compartments that form the basis of Slovenia forest management. There are as much as 54,363 Compartments in Slovenia. Out of this, 25 Compartments have no forest area at all and 3,897 have only non-exploitable forest (forest categories 3 and 4). In summary, the Compartment with exploitable forest area are "only" 50,441. In particular, the analysis is based on the data on:

- the 10-years allowable cut, and
- the actual cut carried out (annual average of recent exploitations).

Main scope of the analysis is to attribute to the forests within each compartment the quantity of woody biomass that could be used for energy, excluding the assortments that are for timber and putting into a separate category the assortments that are suitable/preferred by other non-timber users, such as particle board, wood fibre, tannin and mechanical pulp industries.

Reference data:

- 2009 Land Use (LU) map (ver. 2010). This map represents the main cartographic reference for all biomass resources (forestry and agricultural). See Annex 1 for Land use map classes and other details. Concerning forest area and distribution, reference will be made to the land use class 2000 (forest).

- The map of forest compartments is the most important forestry reference. This map includes 54,363 compartments and covers the entire national territory, except for the region of Novo Mesto, where compartment limits follow forest boundaries.
- Forest Stands map and associated forestry data. This map includes only forest stands (353,704) and exclude non-forest areas. Forest stands are subdivisions of forest compartments. The volume and increment values by assortment types are calculated at stand level and aggregated at compartment level.
- SFS databases. The database of forestry data maintained by the SFS is extremely rich. In addition to the Compartment and Stand-level data that form the basis of the management plans, SFS databases include other forestry data from inventories and permanent sample plots, local felling records, etc. This wealth of data was used in the process of analysis to estimate stock and productivity values by compartment.

The description of the contents of the two main databases produced from SFS data for the purpose o this study is provided in Annex 4. The database **FOND1x.dbf** summarizes forest compartments' information while the database **KOSORTIX.dbf** summarizes forest compartments' information on wood products assortments at cadastral community level according to management plans' 10-years allowable cut.

The most relevant Volume variables available from SFS databases include:

- Total volume (by species, qualities, assortments)
- Total increment (by species, qualities, assortments)
- Total 10-years allowable cut (conifers/broadleaves, qualities, assortments)

Actual cut versus allowable cut data

In addition, records are also available on actually cut volumes which are collected at KO-level. The recorded actual cut data allow to assess the real wood production versus the planned one (allowable cut). In order to have a cartographic representation of the actual wood extraction, the actual/allowable cut ratio is applied to compartment level for all estimated volumes.

There is some evidence, however, that the recorded values do not report the hole wood extraction actually taking place, which causes a systematic underestimation of the true wood flow. Independent observations of actual cut levels carried out on a statistical sample basis indicate that the estimated actual cut volumes (80% of allowable cut) are significantly higher than the values indicated by the recorded actual cut data (66% of aloable cut). However, these estimates on the actually cut volumes are considered preliminary and therefore they will not be used as authoritative.

Additional variables derived from volume data

The following variables are derived from the volume variables reported in SFS databases through application of expansion and conversion factors:

- Dendromass, or total aboveground woody biomass, relative to allowable cut volumes and to actual cut volumes. To assess this, the volume values must be expanded to include the branches and tree tops below 7 cm. According to the Slovenia Forestry Manual and considering average DBH and height values, the volume below 7 cm is around 18.25 % of gross volume above 7 cm, with little variation among species groups (see Annex 5). The unit for this variable is oven-dry tons.

- Dendromass of non-timber volume suitable/preferred for other non-timber uses (particles, fibre, pulp)[1]. The unit for this variable is oven-dry tons. Mitija Piškur, SFI, contributed in the definition of the species and assortments suitable for particle and fiber board industry (see Annex 3).
- Aboveground biomass, to be derived by adding leaves component to the total dendromass defined above. The unit for this variable is oven-dry tons.
- Total biomass, to be derived from the aboveground biomass through the application of the root/shoot ratio. The unit for this variable is oven-dry tons[2] and Carbon content.

The most relevant factors applied to derive woody biomass values from management plans' volume values are presented in Annex 5.

Geodatabase of forestry parameters

The forestry parameters from SFS databases (from compartments, stands, other references o estimated ad-hoc) are associated at the Compartment map as attributes. The geodatabase **comp09_d.mdb** includes this extremely rich and detailed set of data. The current version of the database includes 177 fields, which are attributes associated to each one of the 54,363 Forest Compartments of Slovenia.

The full list of Compartment-level attributes is provided in Annex 6.

Mapping procedure of forestry parameters

The procedure to spatially distribute the estimated woody biomass parameters is the following:

1. Rasterize the LU map at the selected resolution (25m)
2. Rasterize Compartments on the ID code
3. Calculate the number of LU-forest pixels (class 2000) in each Compartment
4. Calculate the total biomass stock, annual increment, non-timber annual allowable cut, annual allowable cut of preferred fuelwood species, annual allowable cut of preferred particle board assortments, etc., by Compartment
5. Divide the Compartment values listed above by the number of LU-forest pixels (3 above) and allocate the resulting values to each LU-forest pixel of each compartment.

3.2.1.3 Non-forest woody biomass

The woody biomass in non-forest classes was estimated during the first WISDOM analysis (FAO Project 2003-2005) on the basis of a statistical ortho-photo sample and field observations. Although still tentative, these values remain the only available reference for this particular item and are therefore used to assess the woody biomass resources outside forests.

The result of the non-forest woody biomass survey, shown in Table 3, are associated to the (slightly changed) land use classes of the new Land Use map of Slovenia, as shown in Annex 6, table A7.1).

[1] Only one particle board industry, one fibre board industry and one mechanical pulp industry exist at present in Slovenia. There seem to be no real competition with Energy uses on the feedstock but this remains a potentially sensitive subject and it's therefore useful to report on the availability and distribution of the raw material suitable and preferred for this industrial use.

[2] A first estimation of Carbon content may be obtained by applying a 0.5 factor to this value.

Table 3: Summary results of non-forest woody biomass survey (Drigo and Veselič in FAO 2006)

			Mean Stocking		Mean Increment			
Code	Land use classes	Total area (ha)	m^3/ha	CV%	m^3/ha/yr	CV%	total stocking	total increment
1100	Fields and gardens	213,985	3.0	119.56	0.10	121.69	649,466	21,958
1221	Intensive orchard	5,049	33.1	78.84	1.12	79.53	167,004	5,675
1222	Extensive orchard	19,849	32.1	48.94	1.14	47.83	637,212	22,591
1310	Intensive meadow	159,652	8.5	82.43	0.28	85.27	1,358,629	44,579
1322	Extensive meadow	187,930	19.5	73.74	0.67	73.77	3,670,979	126,499
1410	Re-growth on old farmland	25,246	57.4	63.11	2.16	59.84	1,449,435	54,498
1500	Mixed use (agric / forestry)	18,953	94.6	48.82	3.30	46.58	1,792,963	62,624
3000	Urban and built up areas, roads	108,194	15.6	80.44	0.51	83.75	1,691,725	55,430
		738,858	15.5		0.53		11,417,413	393,854

3.2.1.3 Accessibility of biomass resources

Physical accessibility

The map of accessibility is based on the cost-distance analysis whereby the "origin" layer is made by a merge of roads (all types, including forest roads – but not forest tracts that are not yet mapped) and populated places (including class 3000 – built up and infrastructure - and map of buildings), and where the "cost" layer is the slope.

The continuous values of the resulting cost-distance map are then segmented into discrete classes. representing the level of accessibility in relation to their location. The map shown in Figure 5 shos the 40 accessibility classes derived from the cost-distance map. Class 1 is the most accessible area close to roads and populated places while class 40 is the least accessible class in the most remote areas.

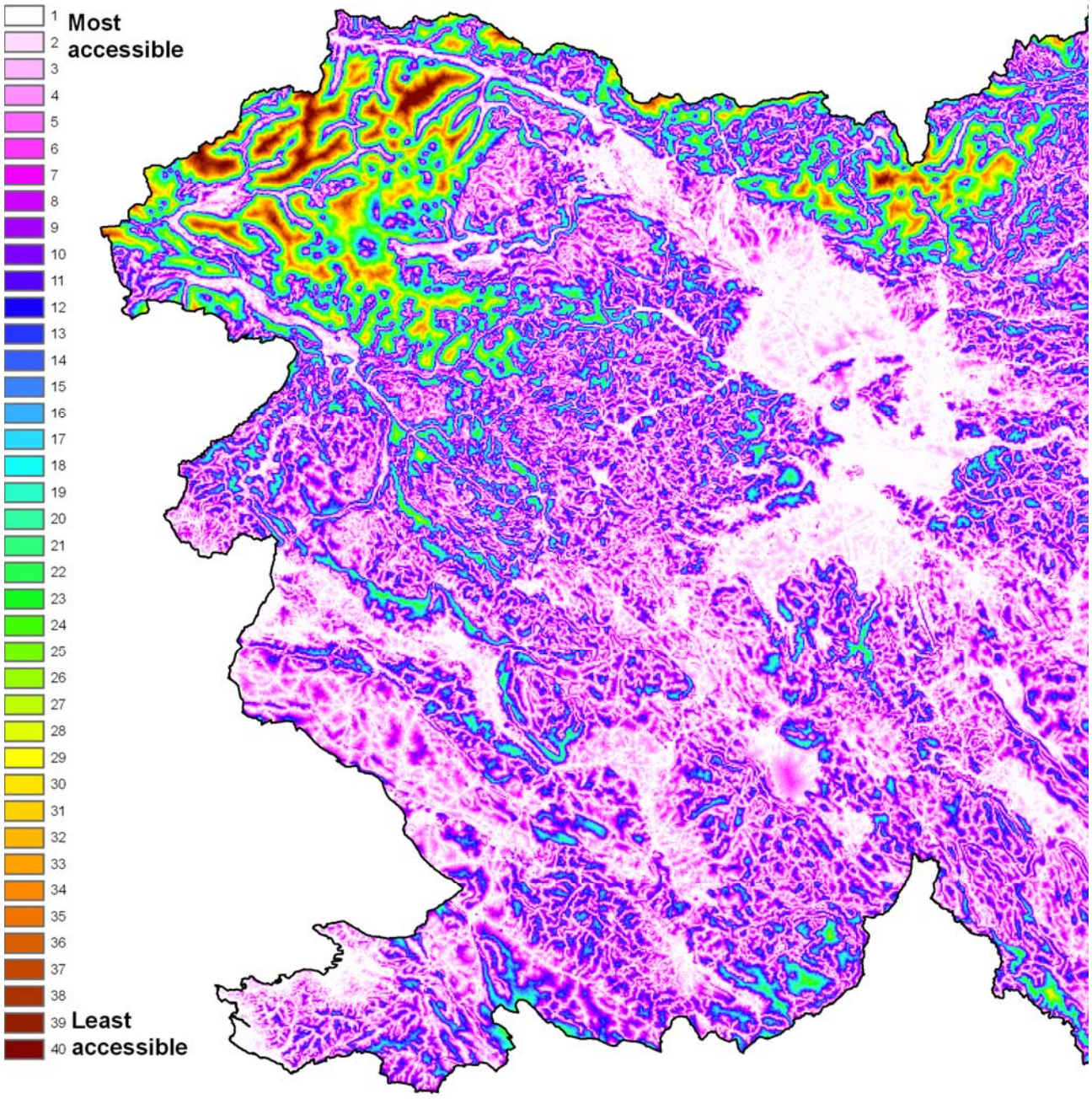
Empirical evaluations indicate that the accessibility is high within 800 m distance on medium-slope forest areas. However, since the evaluation of the economic accessibility presented below includes the estimation of felling and skidding costs that are based on slope and distance (among other factors), the map of the physical accessibility of wood resources has not been necessary.

Since the physical accessibility constraints are taken care of in the calculation of costs the physical accessibility map shown in Figure 4 was used only in woodsheds analysis of selected areas.

Legal

Legal accessibility of forest resources is represented by the function of each forest stand and it is included in the SFS database as "forest category" . Therefore, legally inaccessible forest areas are excluded from the analysis of the potential supply at the level of Compartments' resource definition.

Figure 5: Example of physical accessibility map based on cost-distance analysis.



Economic (commercial)

The issue of the economic accessibility of woody biomass resources was discussed with operators of the biomass sector (fuelwood and chips producers) and with experienced SFS staff in order to define the threshold most commonly applied in Slovenia forests.

Two meetings were held to discuss about the economic accessibility of dendroenergy biomass. The first with Marko Matjasic, Sales Manager of GG Bled and the second with Štefan Kovač, SFS. Specific parameters for the evaluation of felling and skidding costs were derived by Kovač's 2006 publication on harvesting and transportation cost factors "Les – od gozda do peci" (Kovač, 2006).

The procedure of analysis included the following steps:

- Creation of cost equations based on Kovač's parameters for the estimation of felling and skidding costs as functions of average tree size in m^3 per tree for each combination of slope and distance from nearest motorable road (See Annex 9).
- Creation of slope zones 1 to 5
- Creation of distance buffers 1 to 4
- Creation of unique combinations of slope and buffer zones
- Calculation of compartments' average tree size in m^3/tree (map avg_tree) to determine cost of felling and transport per product unit (od t or m^3)
- Creation of the maps of "a" and "b" coefficients for each unique combination of slope and buffer zones (maps coef_a2 and coef_b2)
- Creation of the cost map (in EURO/m^3) calculating the value for each cell as follows:

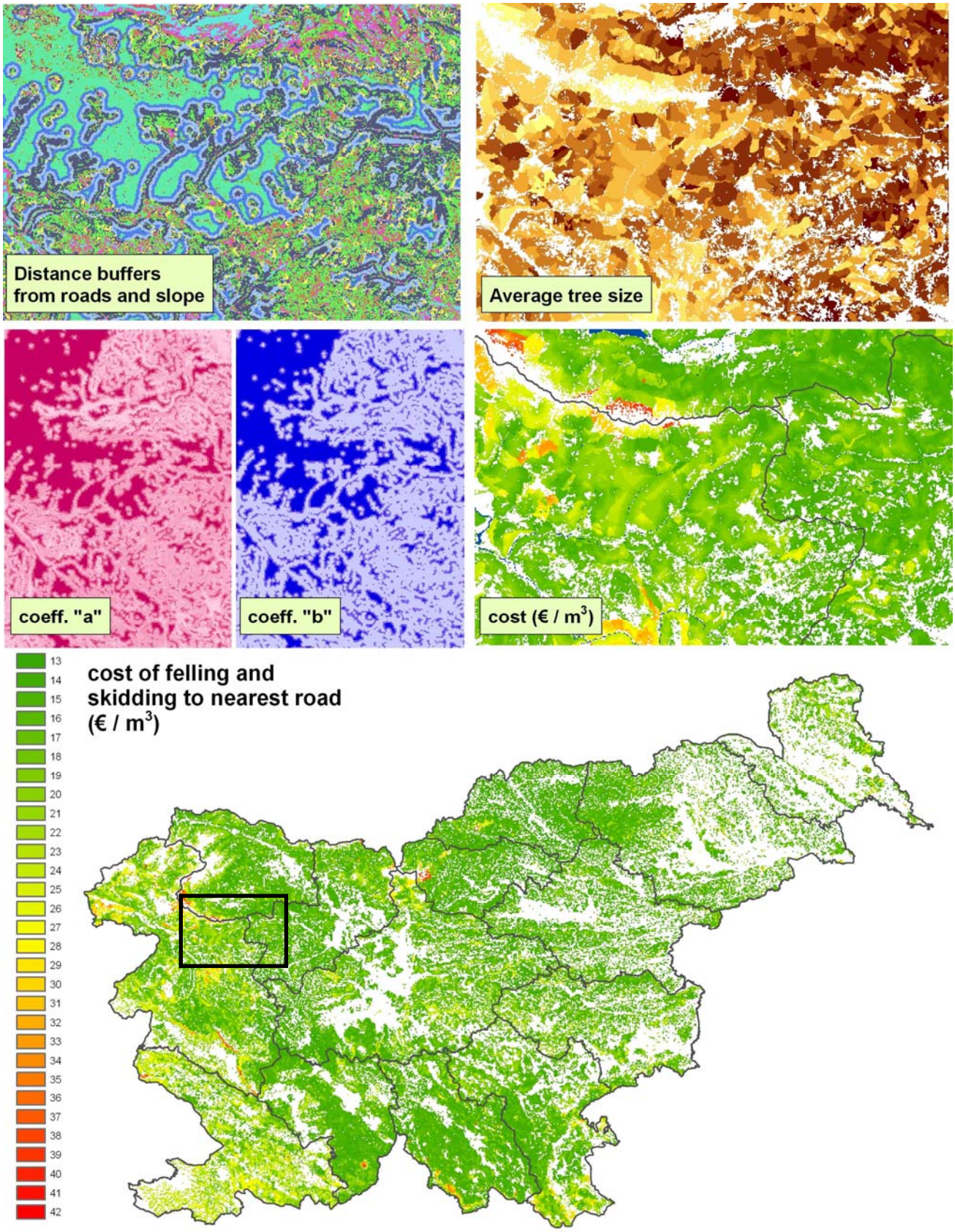
Map of costs (cost_m3) = (coef_a2) * avg_tree ^(coef_b2)

The main cartographic layers produced for the analysis of felling and skidding costs and the resulting map are shown in Figure 6.

The continue values of the resulting map (cost_m3.grd) were subsequently segmented into categories on the basis of the cost limit currently applied (22 €/m^3) and to probable increases of such limit due to higher market prices.

Additional considerations on the final accessibility of forest resources can be based on the relation between the allowable cut and the actual cut. In fact, this relation express the result of both physical and socio-economic accessibility. A given wood resource may be more or less accessible depending on the economic interest it raises to the owner of such resource. In this respect, the extreme fragmentation of forest properties represents a major obstacle as the interest of small individual owners is poor or absent.

Figure 6 : Cost of felling and skidding of dendroenergy biomass. Georeferenced thematic factors and resulting cost map.



3.2.1.4 Agricultural sources

The quantity of woody and non-woody crop residues at harvesting sites that may be considered available for bioenergy use is be estimated and mapped based on the following data:

- 2009 Land use map, and specifically the class 1100 “Fields”, which allows to locate the agricultural area dedicated to annual crops and other specific crops, such as vineyards, and olive trees.
- Map of agricultural fields (GERK) with individual field codes. These codes are linked to the declarations of actual crop areas filed by farmers in order to obtain subsidies.
- Crop statistics from the requests for subsidies filed every year by the farmers maintained by the Slovenia Chamber of Agriculture and Forestry. These details cover the major part of the total cropped area and they allow estimating the fractions dedicated to the various crops as percent of the total surface (obtained from the land use map). The data relative to the year 2006 was provided by ACTUM (file AGRI data 2006.xls). For a more complete and up-to-date analysis the original data may be requested to Chamber of Agriculture and Forestry for 2009 (or the full time series) and associated to GERK field codes.
- Average residues production by crop type to be estimated on the basis of local data that must be obtained from competent Slovenian sources (the Chamber ?) and/or literature review. The values adopted in the WISDOM analysis carried out in Emilia Romagna Region in Italy are shown in Annex 6 as indirect reference (to be replaced by direct local values).
- Estimation of the usable fraction of the residues per crop type and per hectare. This aspect, which depends on agronomic, practical and economic considerations must also be discussed with competent informants from the agricultural sectors.

In order to clarify the state of knowledge concerning agro-energy aspects and with the scope of to assuring good collaboration and complementarity of analysis, a meeting was held with the colleagues Peter Psaker from the Chamber of Agriculture and Forestry (peter.psaker@ce.kgsz.si), Joze Verbic from the Slovenia Agricultural Institute (joze.verbic@kis.si) and Mihael Koprivnikar from BIOENERGIS project (miha.koprivnikar@kgsz.si).

As agreed at such meeting, the estimation and mapping of crop residues production potential was done on the basis of available agricultural data and the availability of such residues for energy uses was estimated in collaboration with Peter Psaker and Joze Verbich. Crop residues were calculated at obcina level and allocated as attributes to land cover classes (agri_resid.shp rasterized to agres_odkg.grd).
Concerning the estimation of moist biomass and Biogas plants feedstock, reference is made to the work recently done by the Chamber of Agriculture and Forestry (Peter Psaker) <GET REFERENCE!>.

3.2.2 Indirect sources

3.2.2.1 Forest industries

Sawmills and furniture making industries are important sources of woody biomass potentially useful (or already used) for energy production.

The information on wood industry primary production and residues production is not directly available. However, several studies and data sources can be used or consulted in order to estimate and map the woody biomass resources of potentially available from this sector:

- SFS questionnaire survey recently completed (yet to be analyzed) over 630 companies (prevalently small size enterprises, big sawmills were not included). Data on the larger wood industries, collected by the Slovenia Forestry Institute will be added to this dataset with contribution from Mitja Piskur, FSI. From this comprehensive dataset the woody biomass by-products produced , consumed for energy purposes and potentially available for other uses will be mapped using the location description (at least the obcina of location). Missing precise coordinates the quantitative parameters will be attributed to larger settlements of the respective obcinas.
- All industries above 10 employees have the obligation to report annually on the waste/residues generated each year and on its destiny. On a separate inquiry, SSO has gathered some information on the waste/residues production by smaller companies (below 10 employees).

This latter data must be requested to SSO and coupled with the above one generated by SFS to provide a comprehensive estimation of the resource available (produced minus consumed for energy or for other purposes) with acceptable geographical breakdown (Obcina ?)

The chemical and semi-chemical pulp and paper industry doesn't exist any more in Slovenia. Therefore, production and consumption of black liquor has ceased completely.

3.2.3 Recovered sources

Recovered wood (non-contaminated / contaminated)

Data on the non-contaminated recovered wood could not yet be obtained from the relevant municipal offices. Data sources and/or qualified informants must be found concerning the quantity and current use of used pallets.

Other recovered biomass

Concerning other recovered biomasses potentially available for biogas, including primarily municipality by-products such as kitchen waste and sewage sludge, reference is made to the work done by the Chamber of Agriculture and Forestry (Peter Psaker) <GET REFERENCE!>.

3.2.4 Import and export of non-timber woody biomass

[To be collected]

Accoding to the documents from the Project Agri-for-Energy (Krajnc et al., 2010), both export and import of woody biomass have increased in recent years, with a predominance of export.

Quoting the report from Krajnc et al., :

<…After year 2003 the export of wood wastes is rapidly increasing and in 2007 we (Slovenia) exported 296.000 t (together with wood pellets and briquettes), and 333.000 ton in year 2008. On other hand import was also increasing in these years, mainly due to import of pellets and briquettes for co-firing in power plants. According to official data we imported 177.000 t in 2007 and 283.000 t in 2008. …>

[get recent import export data !!]

3.2.5 Supply Module Results

3.2.5.1 Direct sources

Table 4 :Mean annual increment, allowable and actual cut in forest compartments. Summary by Forest Regions. Non-forest areas and resources are excluded from this tabulation. Values are '000 t of oven-dry woody biomass.

			Total woody biomass (timber and non-timber assortments)				Non-timber woody biomass of (dendroenergy mass)			
		Forest Compartment AREA	MAI of total dendromass	Annual allowable cut of total dendromass	Recorded actual cut of total dendromass	recorded total dendromass cut / allowable cut	MAI of non-timber woody biomass	Annual allowable cut of non-timber woody biomass	Recorded actual cut of non-timber woody biomass	recorded non-timber biomass cut / allowable cut
	Map name:		c9mai_dm	c9acut_dm	c9_cut_dm		c9mai_de	c9acut_de	c9_cut_de	
#	Forest Region	Ha	kt DM	kt DM	kt DM	%	kt DM	kt DM	kt DM	%
1	Tolmin	153,019	495.4	308.3	203.1	65.9	338.9	202.8	135.0	66.5
2	Bled	71,536	211.5	108.2	72.3	66.9	91.6	42.1	27.6	65.7
3	Kranj	72,694	293.4	188.0	124.0	65.9	142.4	80.5	53.1	65.9
4	Ljubljana	147,558	549.1	312.8	211.0	67.5	315.8	167.0	110.8	66.3
5	Postojna	79,330	313.5	205.0	135.3	66.0	174.9	95.3	63.0	66.1
6	Kocevje	94,027	406.6	277.3	182.9	66.0	215.1	129.1	85.5	66.2
7	Novo mesto	97,002	445.2	296.7	195.5	65.9	285.5	173.6	115.3	66.4
8	Brežice	71,130	343.3	196.5	130.7	66.5	225.9	120.2	80.0	66.6
9	Celje	76,231	340.6	228.1	151.0	66.2	231.1	140.4	93.1	66.3
10	Nazarje	49,312	223.7	127.0	83.5	65.7	97.3	51.5	33.8	65.6
11	Slovenj Gradec	62,927	235.4	138.1	90.2	65.3	91.8	51.0	33.3	65.3
12	Maribor	102,127	507.1	299.4	198.1	66.1	271.7	149.8	99.3	66.3
13	Murska Sobota	41,965	129.5	94.9	63.3	66.7	113.9	66.3	44.1	66.4
14	Sežana	91,765	249.9	145.5	96.7	66.4	213.0	118.5	78.5	66.3
	SLOVENIA	**1,210,622**	**4,744**	**2,926**	**1,938**	**66.2**	**2,809**	**1,588**	**1,052**	**66.3**

Table 5 :Biomass and dendromass stock, mean annual increment and legally accessible productivity (allowable cut) of dendromass and dendroenergy mass from direct sources. Summary by Forest Regions. Non-forest areas are <u>included</u> in this tabulation and sustainable non-forest productivity is assumed as legally accessible and potentially available for bioenergy uses.

			Total woody biomass from direct sources				Non-timber woody biomass from direct sources	
		Total AREA	Stock of biomass (woody and leaves, above and below ground) in woody vegetation from all LU classes	Stock of dendromass from forests and other LU classes (above ground woody biomass)	MAI of dendromass from forests and other LU classes (above ground woody biomass)	Allowable cut of dendromass from forests and other LU classes (above ground woody biomass)	MAI of non-timber woody biomass from all LU classes	Allowable cut of non-timber woody biomass from all LU classes
	Map name:		biomass_stk	d_mass_stk	d_mass_mai	d_mass_acut	d_e_mai	d_e_acut
#	Forest Region	km^2	kt DM	kt DM	kt DM	kt DM	kt DM	kt DM
1	Tolmin	2,229.4	28,498	22,177	528	341	372	236
2	Bled	1,015.7	13,893	10,992	223	120	103	54
3	Kranj	1,076.4	17,248	13,604	304	198	153	91
4	Ljubljana	2,503.6	30,943	24,202	582	345	348	199
5	Postojna	1,073.4	16,639	13,068	323	215	185	105
6	Kocevje	1,179.9	21,890	17,149	416	287	224	138
7	Novo mesto	1,522.4	21,573	16,805	464	315	304	192
8	Brežice	1,358.9	16,699	12,953	366	220	249	143
9	Celje	1,545.8	18,091	14,117	366	254	257	166
10	Nazarje	691.2	11,571	9,163	231	134	104	58
11	Slovenj Gradec	889.0	13,404	10,667	244	147	100	60
12	Maribor	2,323.1	25,243	19,754	547	339	311	189
13	Murska Sobota	1,336.5	8,738	6,794	151	116	135	88
14	Sežana	1,524.8	11,423	8,905	280	176	243	149
	SLOVENIA	**20,270**	**255,853**	**200,350**	**5,025**	**3,206**	**3,089**	**1,869**

Figure 7: Stock of total biomass in living woody vegetation (top) and stock of above ground woody biomass (dendromass) (bottom).

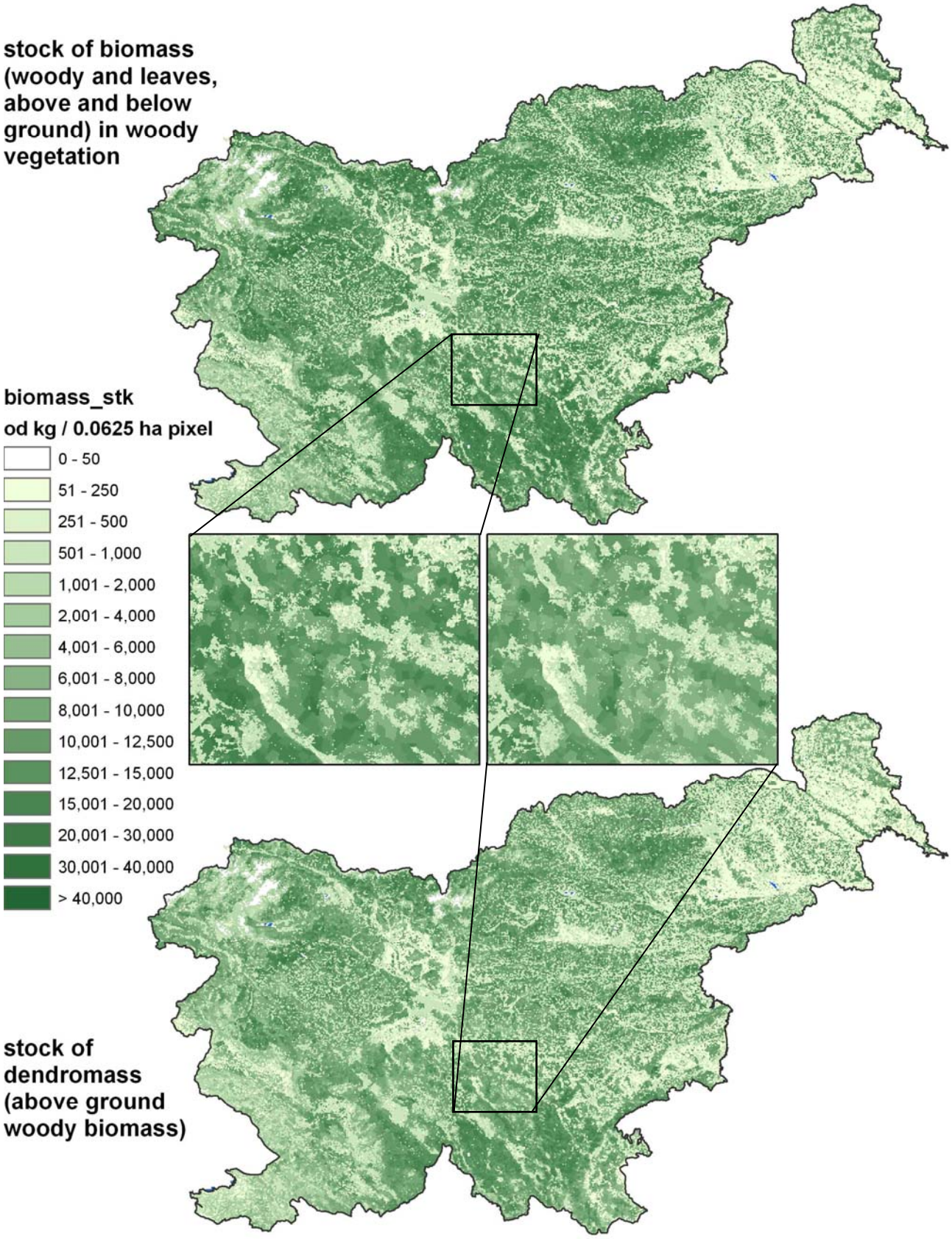
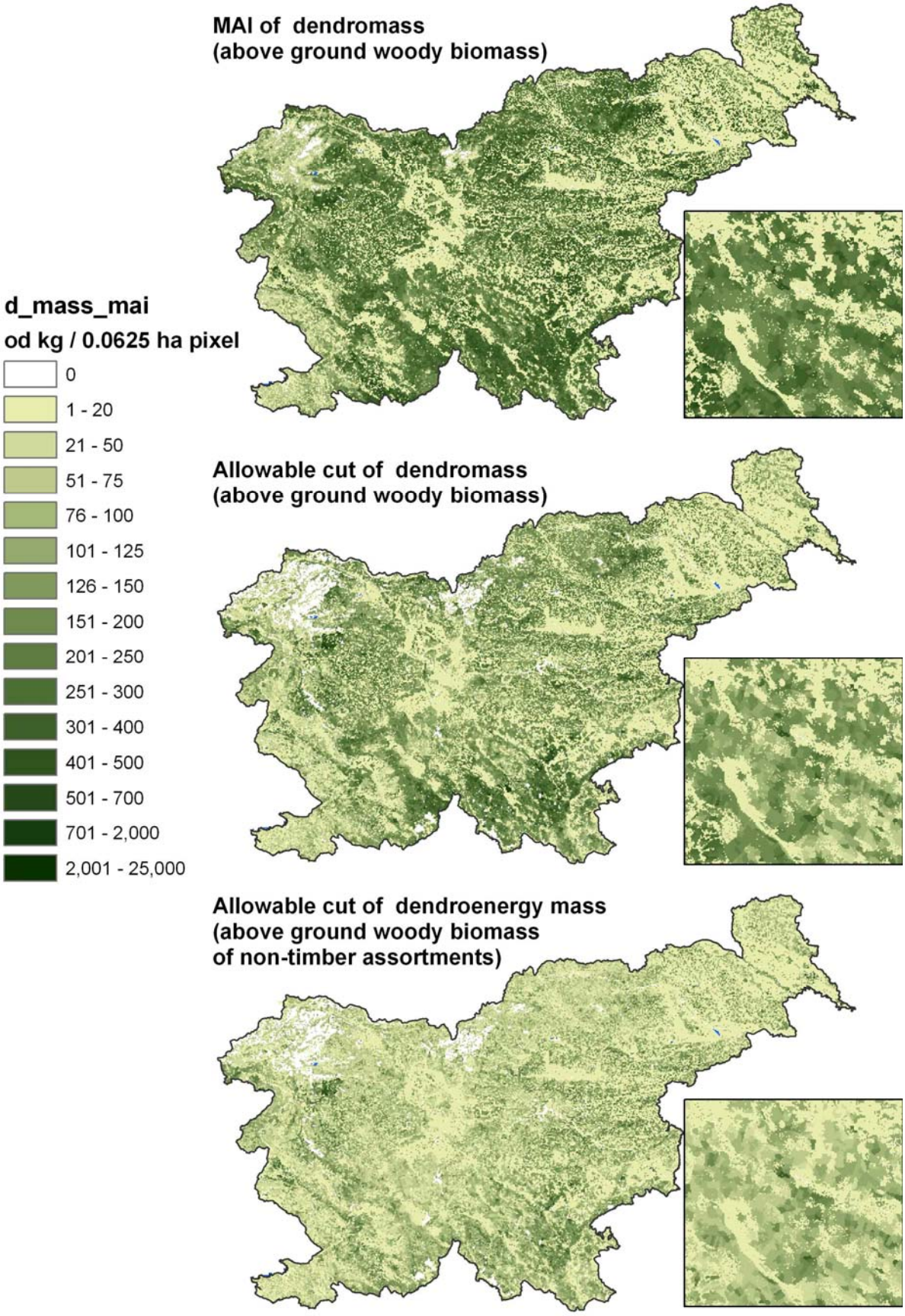


Figure 8: Annual increment and allowable cut of above-ground woody biomass (dendromass) and annual allowable cut of non-timber woody biomass (dendroenergy mass.)



3.2.5.2 Indirect sources

The main indirect source of woody biomass is represented by sawmills and wood processing industries.

Figure 9 shows the distribution of the geo-referenced sawmills included in the map Sawmills2010_point_rev.shp (in this map the point data coordinates were reviewed slightly in order to avoid more than one sawmill falling in the same 25m pixel).

The available statistics provided useful details on the quantity of residues produced in 2010 by coniferous and broadleaves species groups. In addition, sawmills data provided details on the destiny of the produced residues, as shown in Table 6 .

Figure 9: Distribution of sawmills

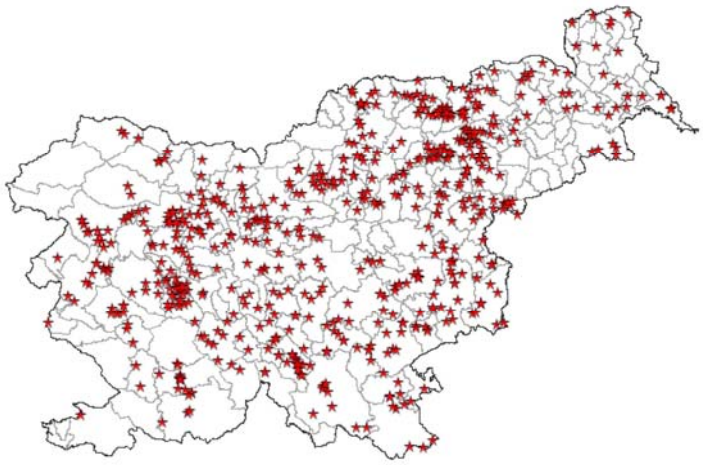


Table 6: Sawmills' residues by Forest Region

		Residues from broadleaves spp.	Residues from coniferous spp.	**All sawmill residues**	Sawmill residues used for own energy use	Sawmill residues sold for energy uses	Sawmill residues sold to industries	Sawmill residues not used
	Map name:	resbro_kg	rescon_kg	res_kg	resown_en_kg	ressell_en_kg	ressell_in_kg	Unused
#	Forest Region	kt DM	kt DM	kt DM	kt DM	kt DM	kt DM	kt DM
1	Tolmin	2.5	4.5	**7.1**	0.6	0.4	4.9	1.1
2	Bled	0.0	1.8	**1.8**	0.3	0.8	0.3	0.4
3	Kranj	1.2	9.1	**10.3**	2.9	3.7	3.0	0.7
4	Ljubljana	5.4	21.9	**27.4**	5.9	8.7	10.0	2.8
5	Postojna	0.3	2.4	**2.6**	0.7	0.4	0.6	1.0
6	Kocevje	11.2	9.1	**20.3**	3.8	9.2	7.2	0.1
7	Novo mesto	4.9	9.9	**14.8**	1.9	3.8	8.9	0.3
8	Brežice	4.6	3.4	**7.9**	2.2	3.2	2.0	0.6
9	Celje	2.9	7.6	**10.5**	2.7	4.6	2.9	0.3
10	Nazarje	0.1	5.7	**5.8**	1.3	0.7	3.4	0.4
11	Slovenj Gradec	0.0	14.5	**14.6**	0.4	0.9	13.2	0.0
12	Maribor	1.8	4.7	**6.5**	3.7	1.5	1.1	0.2
13	Murska Sobota	1.8	1.7	**3.5**	0.6	1.8	0.2	1.0
14	Sežana	6.7	1.8	**8.6**	5.0	1.3	2.3	0.0
	SLOVENIA	**43.5**	**98.3**	**141.8**	**32.0**	**40.9**	**60.1**	**8.8**

After the closure of the only pulp and paper industry, there is no longer production of black liquor in Slovenia.

The estimation and mapping of recovered wood has not yet been carried out.

3.2.5.3 Summary of woody biomass and crop residues

The legally accessible non-timber woody biomass annually produced by direct and indirect sources is shown in Figure 10. The distribution of non-woody crop residues that is potentially available for energy uses is shown in Figure 11. Summary values by Forest Regions are reported in Table 7.

Table 7: Summary of woody biomass from direct sources and indirect sources and non-woody crop residues. Feedstock suitable for other non-energy uses (fiber, particle board, mechanical pulp, tannin) is included.

		Woody biomass residues from indirect sources (wood processing industries)	Legally accessible non-timber woody biomass from direct and indirect sources	Recorded actual cut of non-timber woody biomass from direct and indirect sources	Crop residues (non-woody) at crop site estimated available for energy uses
	Map name:	res_kg	legac_de_res	cut_de_res	agres_dmkg
#	Forest Region	kt DM	kt DM	kt DM	kt DM
1	Tolmin	7.1	243.0	175.1	13.4
2	Bled	1.8	55.4	40.9	0.9
3	Kranj	10.3	101.0	73.5	6.5
4	Ljubljana	27.4	226.8	170.5	11.3
5	Postojna	2.6	107.8	75.5	1.1
6	Kocevje	20.3	158.7	115.1	1.2
7	Novo mesto	14.8	206.9	148.7	12.3
8	Brežice	7.9	151.2	111.1	19.8
9	Celje	10.5	176.8	129.5	16.5
10	Nazarje	5.8	64.2	46.5	2.1
11	Slovenj Gradec	14.6	74.1	56.4	3.1
12	Maribor	6.5	196.0	145.5	48.3
13	Murska Sobota	3.5	91.3	69.0	49.1
14	Sežana	8.6	157.2	117.2	11.6
	SLOVENIA	**142**	**2,011**	**1,475**	**197**

Figure 10: Potential legally accessible productivity of non-timber woody biomass from direct and indirect sources

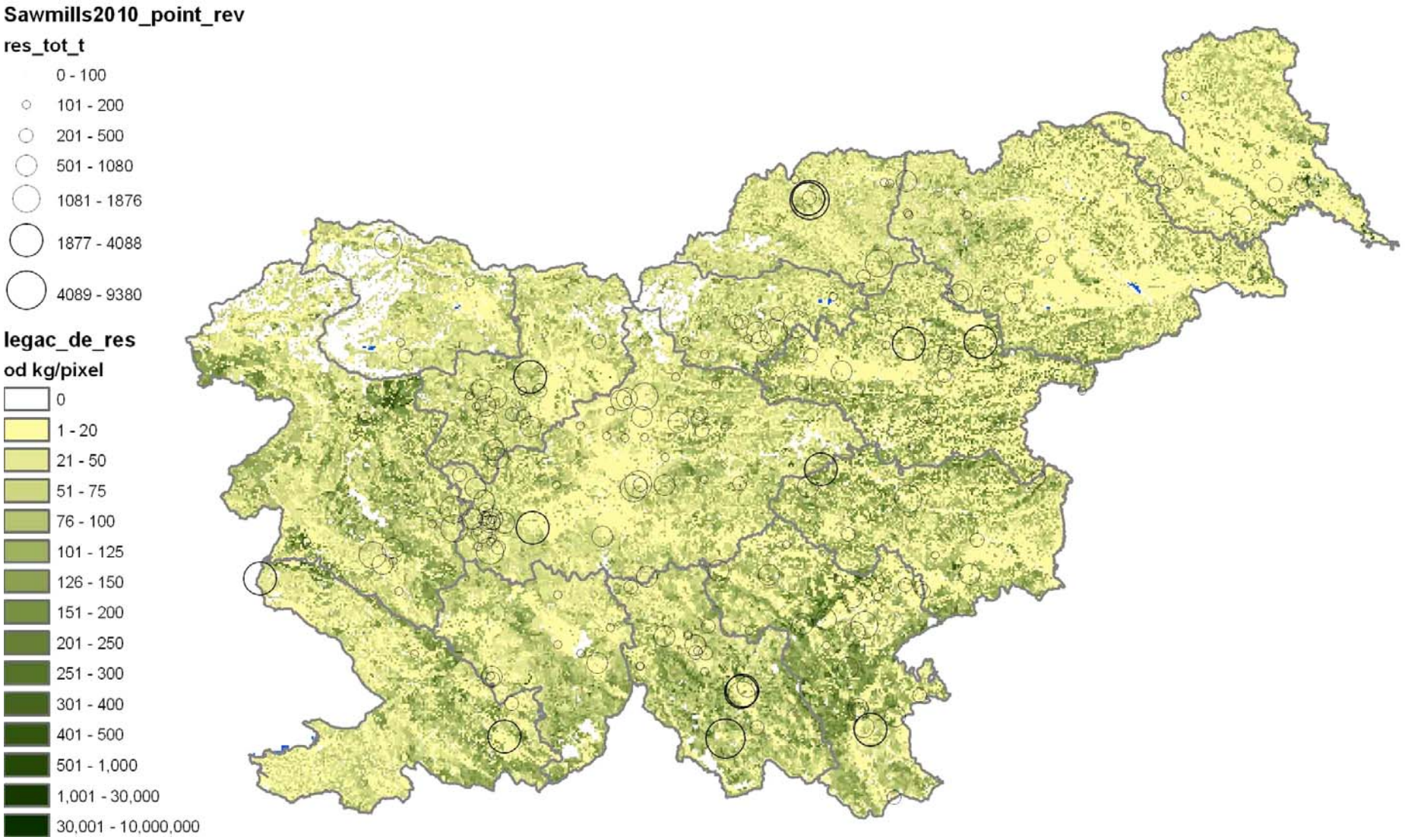
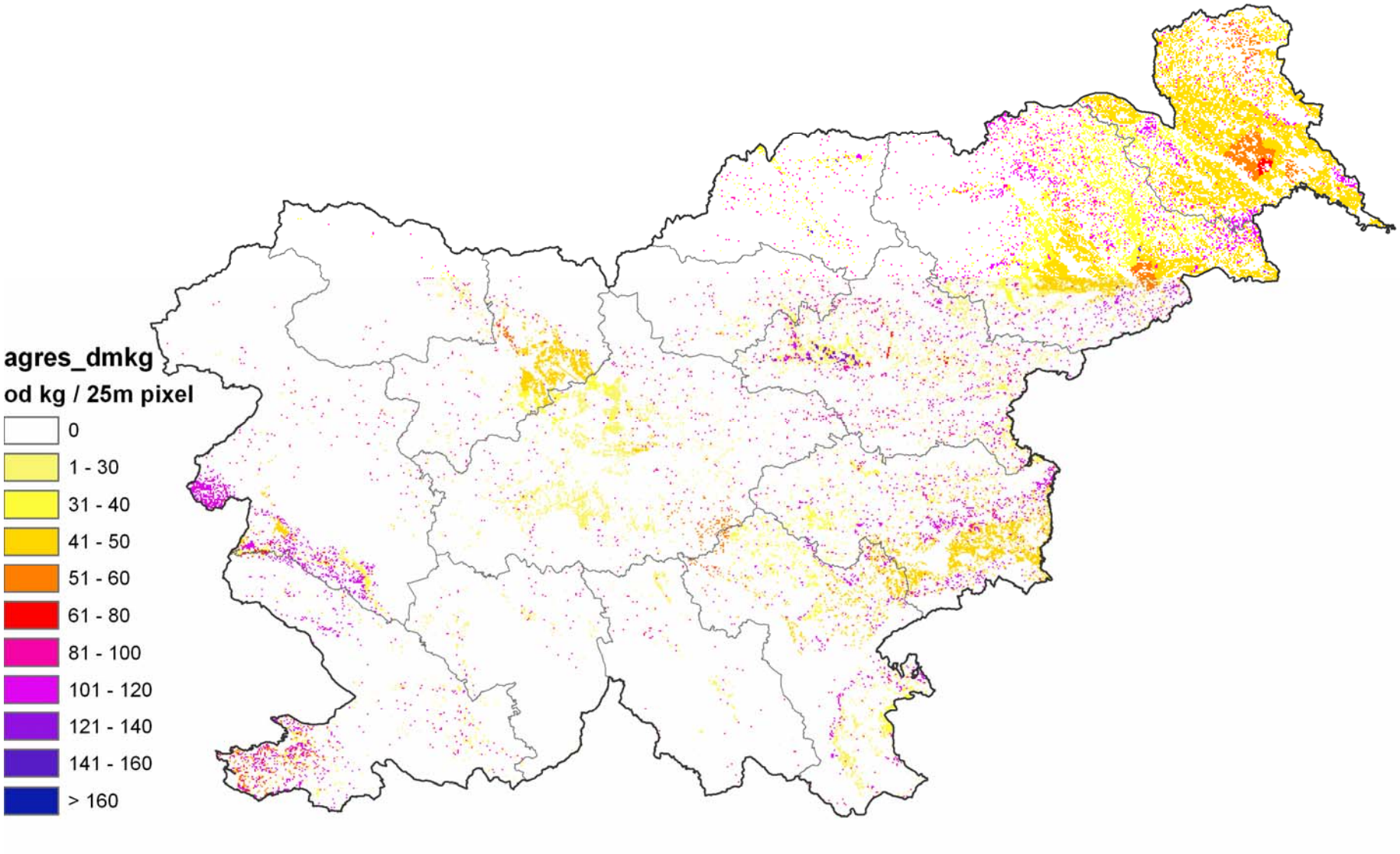


Figure 11: Non-woody crop residues at crop site estimated available for energy uses.



3.2.5.4 Feedstock suitable for fiber industries

In order to assess the real level of competition between energy and fiber industries on the available feedstock, the non-timber assortments suitable for fiber, particle board, tannin and mechanical pulp processes was separately estimated. The estimation was based on the suitability ranking presented in Annex 3 applied to forest compartment data and sawmill residues data.

The legally accessible "fiber" feedstock potential from direct and indirect sources (map acutres_fib) was estimated by adding the following two components:

- allowable cut of dendroenergy mass (above ground woody biomass of non-timber assortments) suitable for fiber industries in forest compartments
- industrial wood residues

The current "fiber" feedstock potential was estimated on the basis of the recorded actual cut data (as opposewd to allowable cut). The result of the analysis is reported in Table 8.

Table 8: Summary of non-timber woody biomass suitable for other non-energy industrial uses, such as fiber, particle board, mechanical pulp and tannin).

		Woody biomass residues from indirect sources (wood processing industries)	Allowable cut of non-timber assortments suitable for fiber industries	Recorded annual actual cut of non-timber assortments suitable for fiber industries	Allowable cut of non-timber assortments suitable for fiber industries in forest compartments plus industrial wood residues	Recorded annual actual cut of non-timber assortments suitable for fiber industries in forest compartments plus industrial wood residues
	Map name:	res_kg	c9_acutfiber	c9_cutfiber	acutres_fib	cutres_fib
#	Forest Region	kt DM	kt DM	kt DM	kt DM	kt DM
1	Tolmin	7.1	124.4	103.0	131.5	110.0
2	Bled	1.8	39.2	25.7	41.0	27.6
3	Kranj	10.3	71.7	48.0	82.0	58.3
4	Ljubljana	27.4	145.6	98.3	173.0	125.7
5	Postojna	2.6	78.6	53.4	81.3	56.0
6	Kocevje	20.3	114.1	77.8	134.4	98.1
7	Novo mesto	14.8	115.7	89.3	130.5	104.2
8	Brežice	7.9	73.2	63.7	81.2	71.6
9	Celje	10.5	107.8	80.7	118.3	91.3
10	Nazarje	5.8	47.6	31.2	53.4	37.0
11	Slovenj Gradec	14.6	44.9	29.4	59.5	43.9
12	Maribor	6.5	98.6	77.2	105.1	83.8
13	Murska Sobota	3.5	14.3	20.5	17.9	24.0
14	Sežana	8.6	20.4	30.3	29.0	38.9
	SLOVENIA	**142**	**1,096**	**828**	**1,238**	**970**

3.3 Demand Module

Primary scope of the Demand Module is to assess and map the current consumption of woody biomass for energy in the various sectors.

According to the Slovenia Energy Balance (EUROSTAT 2010, referring to 2008 situation) reported in Annex 11, 8.1% of the Slovenia final energy consumption was met by biomass (mostly woody). This share increases to 29.2% when referring to the household sector.

This latter value well corresponds to the results of the 2002 survey of population, households, dwellings and buildings, whereby 30 % of slovenian households use wood as the exclusive/primary source of energy for house heating.

The same source tells that for the industrial sector the share of the final energy consumption met by biomass was 5.1% in 2008.

The estimation and mapping of the consumption of woody biomass covered the residential and the industrial sectors The consumption in the commercial and public sectors could not be estimate so far due to lack of reference information. The consumption in these sectors is probably marginal, compared to other sectors, but it is recommended to assess them as soon as possible.

3.3.1 Residential consumption

The estimation and mapping of residential consumption is carried combining elements already used in the 2005 WISDOM analysis (surface of dwellings heated by wood in each Kadastral Obcinas – KO-) and new elements (map of buildings, heating days requirements estimated by climatic zones).

Unfortunately, the census of buildings (2006/7), whereby the map was created, did not include parameters relative to the fuels used for heating and therefore in spite of its powerful database cannot be used to revise the estimation of biomass consumption in the residential sector but can only be used as spatial proxy, for the distribution over space of residential consumption within the Kadastral Obcinas (KO).

There is no new data relative to the household consumption from which a trend analysis on household energy consumption can be built. The 2002 statistics from the census of dwellings and population remains the last valid reference and therefore the updating of the residential consumption is done only in respect of population growth rates. Hence, the dwelling surface heated by wood for year 2002 (based on census of dwellings and population) is updated to year 2010 on the basis of population growth rates by County (obcina).

The national level requirement for house heating are estimated on the basis of the heated surface and average energy needs per m^2 of heated surface, which is estimated at 160 kWh (ref.: Ministry of Environment. 2002). . The additional woodfuel consumption for cooking and water heating was estimated as 30 % of the space heating fuel, as in the previous study, with reference to the “Study for energy plan and 2030 projection” conducted by the Ministry of Energy. The average energy requirement per m^2 of heated surface for space heating, cooking and water heating is estimated at 208 kwh .

In order to account for the climatic range of conditions of Slovenia, and the consequent range of energy needs for space heating, the local consumption (of energy, of wood mass and volume) is then weighted on the basis of the number of days requiring heating, as shown in Figure 12.

The process implies the estimation of the energy (and wood) necessary to heat one m^2 for one day with average insulation (kWh= 0.834 or wood=0.4 dm^3, or 0.26 od kg, assuming 65% efficiency) and the application of such value to the map combining heated surface and number of heating days.

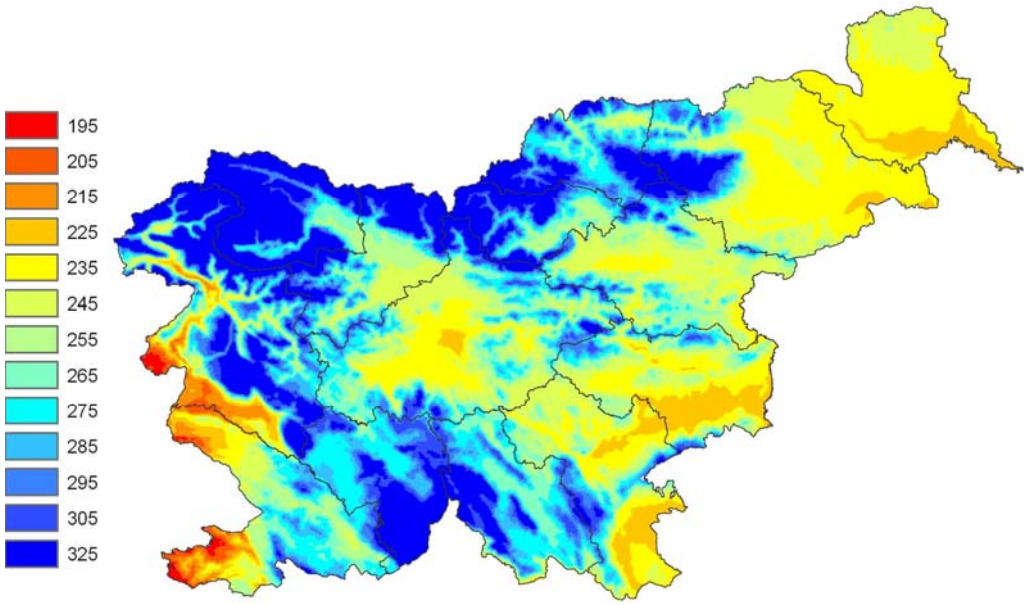
On the basis of the new elements mentioned above, the spatial distribution of 2009 household consumption was mapped as shown in Figure 13.

Spatial distribution of residential consumption.

The spatial distribution of residential consumption within KOs was done using as spatial proxy the map of Slovenia Buildings edited to serve the purpose of analysis. The procedure included the following steps:

1. The complete polygon data was combined with the point map of residential buildings to select the residential building polygons. From the resulting data the buildings below 2.8 m height, with surface below 10 m^2 and with height above 3 stories (for which the use of biomass fuels is very unlikely) were further excluded. The final map contains 384,775 buildings.
2. The surface of selected polygons was then expanded by a factor determined by the number of floors. (dividing total height by 2.7-3m). The new surface of the building on the map is therefore proportional to the heated surface of the apartment therein.
3. The "expanded" residential building vector map was then rasterized to 25 m (snap to Land Use raster map).
4. The number of building pixels was added to KO map and pixel number per KO was determined.

Figure 12: Map of Slovenia showing the number of days requiring heating. [get citation]



In future analysis chimney statistics may become useful in the analysis of woodfuel consumption. According to recent directives, all chimneys in Slovenia must annually be cleaned and data is systematically collected and sent to Ministry of Environment. Chimney statistics include fuel used and emission statistics. It appears that this data collection is not yet fully implemented but it is likely to become a future source for the estimation of consumption and related emissions.

3.3.2 Industrial consumption

Industries' consumption of biomass for energy is still poorly documented.

In future the quantity of industrial consumption will be determined on the basis of the annual report by industries above 10 employees on the waste/residues generated each year and on the destiny of such residues.

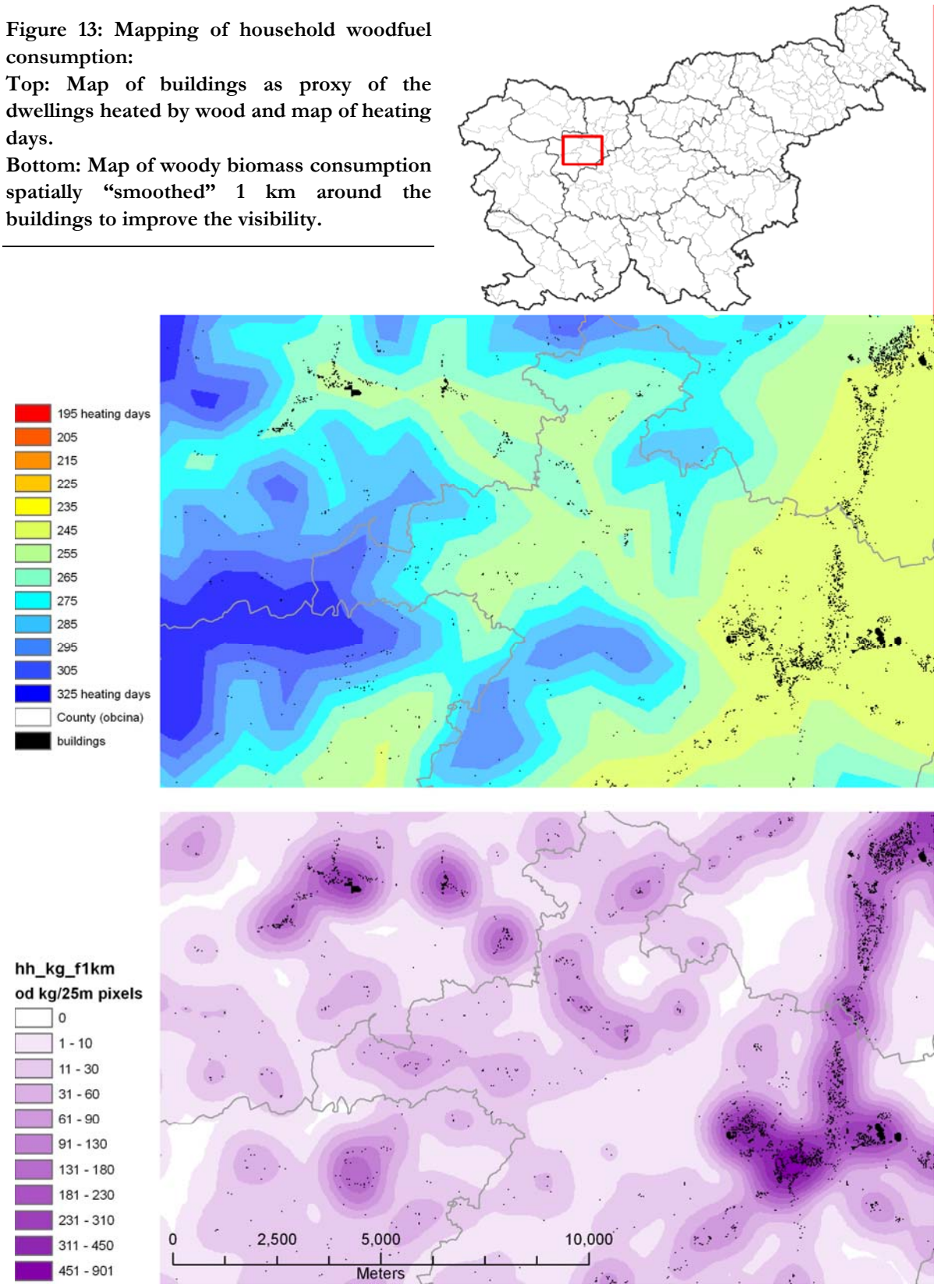


Figure 13: Mapping of household woodfuel consumption:
Top: Map of buildings as proxy of the dwellings heated by wood and map of heating days.
Bottom: Map of woody biomass consumption spatially "smoothed" 1 km around the buildings to improve the visibility.

Statistics on the use of wood & wood residues by all industries > 20 employees are available by County (file SSO_use_of_wood_waste_in_all_industries.xls). However, when compared to the independent sawmills data on the amount of wood residues declared for internal energy use (31,960 t) (see Supply Module), there is no match, which makes it difficult to use.

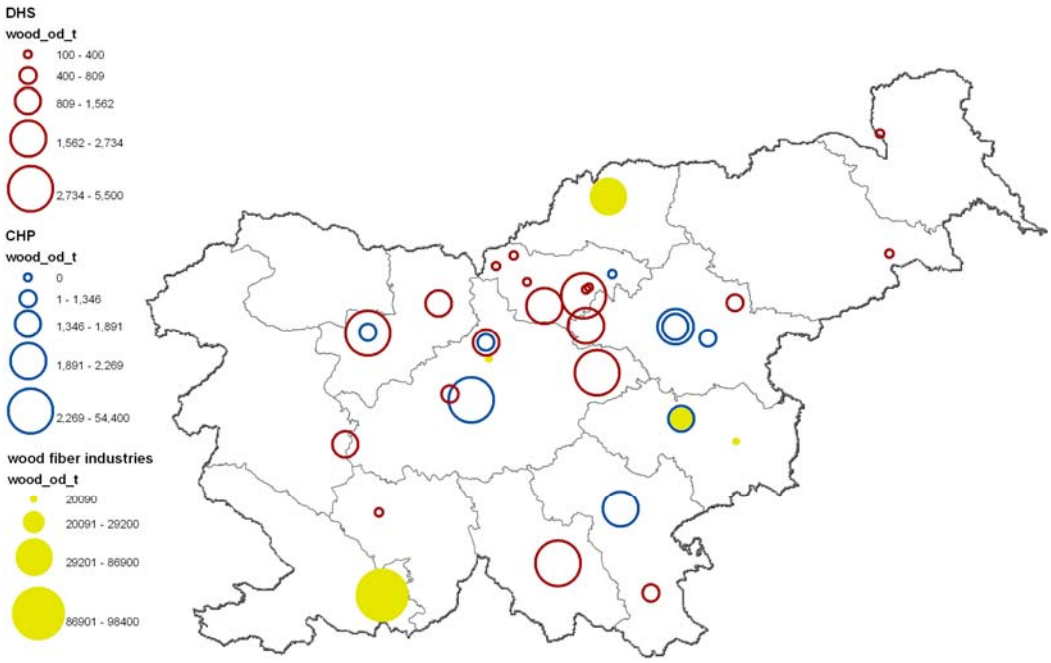
Therefore, the estimation and mapping of the industrial consumption of woody biomass for energy (excluding CHP plants discussed below), was based on the sawmills data on the internal consumption of wood residues for own energy uses.

3.3.3 Biomass plants and district heating systems

The estimation and mapping of the consumption of woody biomass by District Heating Systems (DHS) and Combined Heat and Power plants (CHP) wasa based on the studies carried out by the SFI in the framework of the IEE Project “Agri for energy”.

More specifically, information on the woody biomass consumption and energy/heat production was available by location, as shown in Figure 14. Combined, the resulting woody biomass consumption has been estimated and mapped (dhs_chp_odkg.grd)

Figure 14: Location and size of District Heating Systems (DHS), Combined Heat and Power (CHP) plants and wood fiber industries.



3.3.3 Demand Module results

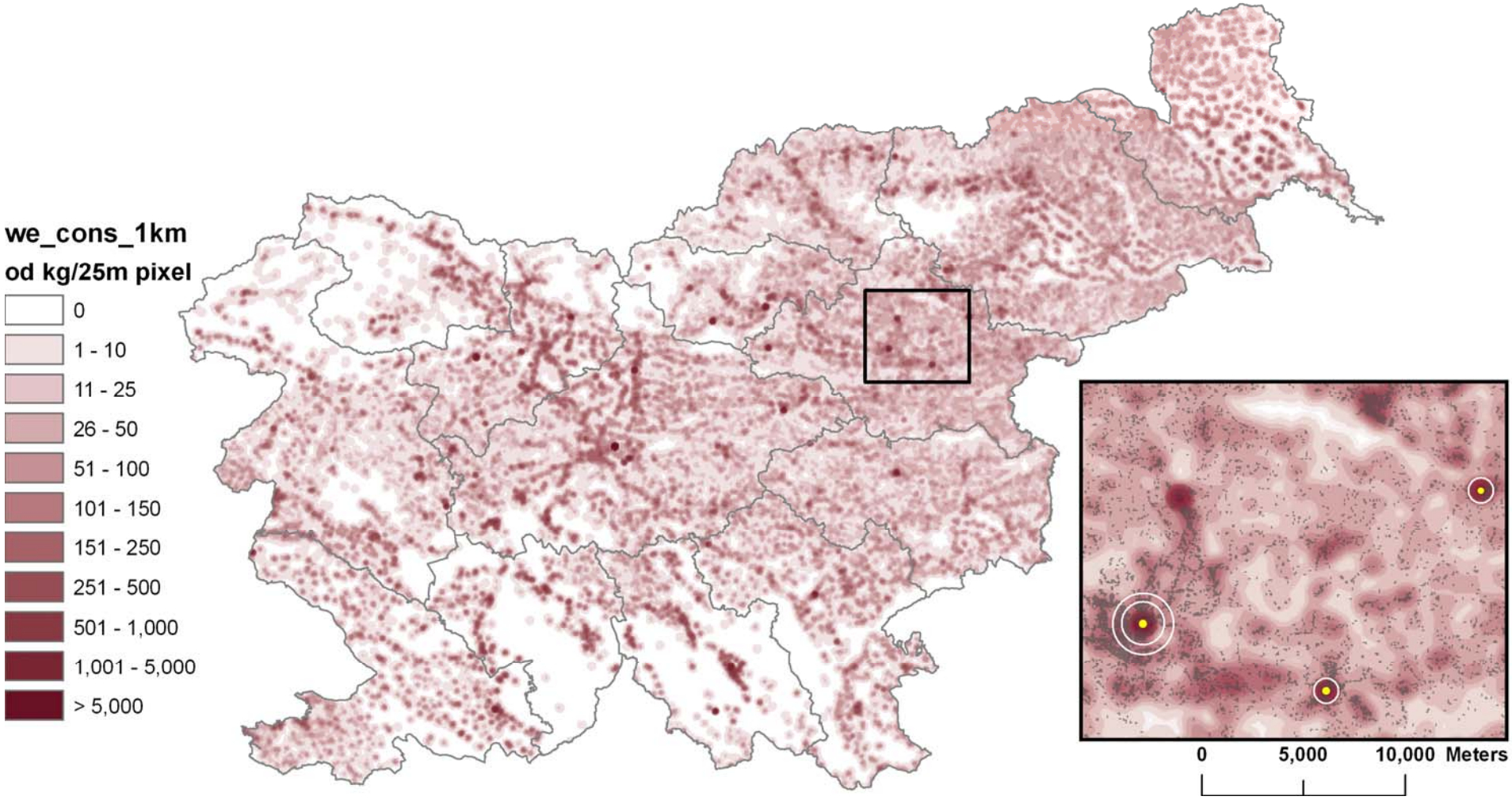
The summary of woody biomass consumption for energy in the various sectors by Forest Region is reported in Table 9. The Table includes the (approximate) consumption of woody biomass by fiber, pulp and tannin industries, which compete for the same feedstock.

The map of the cumulative consumption of woody biomass for energy in residential,industrial and energy sectors is shown in Figure 15.

Table 9: Summary of household consumption of woody biomass for heating and cooking by Forest Regions.

			Household sector				Energy and Industrial sector		All sectors	Main competing use of the feedstock
		Estimated 2010 population	woodfuel users (primary fuel)	Saturation	Household consumption for heating and cooking	Household consumption for heating and cooking	Consumption by DHS and CHP plants	Wood residues used by wood industries for energy	Total woody biomass used for energy	Woody biomass used by fiber, pulp and tannin industries
	Map name:	TOT_POP_10	estim.2010 INH_PRWF	est. Saturation	hh_conskwh0	hh_conskg0	dhs_chp_kg0	resown_en_kg	we_cons_kg0	pulp_fib_kg0
#	Forest Region			%	mwh	t DM	t DM	t DM	t DM	t DM
1	Tolmin	111,180	45,940	41.3	203,585	62,966	1,352	632	64,950	0
2	Bled	66,444	14,356	21.6	71,132	22,000	0	312	22,312	0
3	Kranj	131,665	34,841	26.5	150,637	46,590	8,403	2,854	57,847	0
4	Ljubljana	566,425	100,617	17.8	399,890	123,680	62,452	5,885	192,017	20,090
5	Postojna	41,607	19,390	46.6	94,235	29,145	400	722	30,267	0
6	Kocevje	37,410	22,144	59.2	107,503	33,249	3,437	3,825	40,511	0
7	Novo mesto	100,168	46,407	46.3	168,017	51,965	2,269	1,886	56,120	0
8	Brežice	94,573	42,989	45.5	161,381	49,913	1,891	2,180	53,984	49,290
9	Celje	192,405	69,405	36.1	263,162	81,392	6,140	2,706	90,238	0
10	Nazarje	60,142	16,363	27.2	71,933	22,248	7,257	1,276	30,781	0
11	Slovenj Gradec	68,556	23,747	34.6	101,711	31,458	0	449	31,907	86,900
12	Maribor	327,918	94,522	28.8	358,310	110,820	0	3,675	114,495	0
13	Murska Sobota	119,553	51,363	43.0	201,370	62,281	326	577	63,184	0
14	Sežana	128,920	33,255	25.8	155,780	48,180	0	4,975	53,155	98,400
	SLOVENIA	**2,046,966**	**615,338**	**30.1**	**2,508,646**	**775,886**	**93,927**	**31,954**	**901,767**	**254,680**

Figure 15: Consumption of woody biomass for energy in all sectors. Pixel-level consumption values were spatially "smoothed" 1 km around the consumption sites (buildings, plants, industries) in order to improve visibility. The inset shows the buildings (grey points) to which the household consumption was associated, the DHS and CHP locations, as well as the smoothet values.



3.4 Integration module

3.4.1 Local supply/demand balance

The main product of the Integration Module, which is the supply/demand balance analysis, is done at cell level by subtracting current consumption from supply potential for all relevant assortment categories.

The supply/demand balance analysis by administrative units (Regions, counties, KO) is subsequently calculated by aggregation of cell-level balance data.

Several balance scenarios were considered, as summarized in Table 9 and described below.

"Legal" balance

The "legal" balance is the difference between the entire legally accessible non-timber woody biomass potential from direct and indirect sources and the current consumption of woody biomass for energy and for fiber industries.

Figure 16 shows the result of this analysis. For a better visualization of surplus and deficit areas, the pixel-level balance results have been further processed to represent the local contexts, rather than individual pixel values: each pixel represents in this case the summary balance of the surrounding 750 meters. In this manner the localized sources, such as sawmills, or concentrated consumption sites such as CHP plants become visible and the surplus/deficit areas are more clearly differentiated.

This map shows the surplus and deficit areas according to the allowable cut prescribed by the current forest management plans (decade 2001-2011) and other direct and indirect biomass sources.

Actual balance

Since the allowable cut is not exploited entirely, it is useful to calculate the balance considering the actual cut records in order to represent the present situation more realistically[3].

This balance is a snapshot of the current situation and, since there is no significant accumulation of stocks across the years, tha national-level balance should be close to 0, considering also import/export amounts. In fact, the net national surplus of the actual balance (estimated at 318 thousand tons) is close to the net export (total export – import) of fuelwood, woodchips and residues (Krajnc and Piskur, 2010 [get import/export reference!]).

Theoretical balance

The theoretical balance is calculated on the basis of the mean annual increment (MAI) of the forests (always referred to the non-timber woody biomass) and is meant to show the limit of the sustainable resource base.

The allowable cut will never cover the MAI but it is interesting to note the huge difference between the MAI of non-timber woody biomass, the current allowable cut (57% of MAI) and the actual cut (37% of MAI) as reported in Table 4 (Section 3.2.5 Supply Module Results).

For the benefit of the forest ecosystems, there is scope for, and need to, increasing wood extraction in Slovenia. This is a well recognized issue and the forest management plan for the next decade will increase significantly the allowable cut rate.

[3] However, since there is some evidence that the felling records do underestimate the real exploitation, this balance is probably "pessimistic" in the definition of surplus levels.

In this perspective, and while waiting for the new management prescriptions, the theoretical balance provides a useful vision of the physiologic biomass potential of the country.

Figure 17 shows the three balance categories calculated at County level.

3.4.1 "Commercial" surplus from local supply/demand balance

The "commercial" balance is analyzed with the purpose of determining more accurately the actual sustainable supply zone of major wood energy and bioenergy markets such as those of urban areas, bioenergy planning and future biomass plants as well as for export purposes.

In the definition of the "commercial" balance the supply side to be considered is only the fraction of the surplus that may be regarded as available and suitable for market-oriented production systems, while the demand side to be considered is the deficit resulting from the local supply/demand balance. The commercial balance map is in fact an elaboration of the local balance map, maintaining unaltered all the cells that show a deficit condition as well as those with a surplus values with a felling and skidding cost below a certain threshold. The remaining cells, i.e. those with local balance values between 0 and the given surplus threshold, are considered non-influent and assigned a 0 value. This means accounting for deficit conditions but considering only the "commercial" share of local surplus, thus excluding the surplus resources that do not justify the investment required for their commercial exploitation..

The term "commercial" is used here in a generic sense, without true economic/market analyses. The aspect considered was the cost of extraction of the woody biomass at the nearest roadside.

According to qualified informants the extrtaction cost threshold currently applied is approximately 22 € per m^3. Above such cost of extraction there is no benefit for the producer given current market prices of wood biomass products.

This is obviously variable because an increase of the market price of woody biomass assortments immediately moves the threshold up thus increasing the quantity of resources economically accessible. For this, three threshold values were adopted, i.e. 22, 26 and 30 €/m^3 in oder to evaluate the impact that a price increase would have on the available quantity of the woody biomass.

Table 10 summarizes the balance between several supply scenarios and the current consumption of woody biomass for both energy and fiber.

Figure 16: Balance between the legally accessible non-timber woody biomass potential from direct and indirect sources and the current consumption of woody biomass for energy and for fiber industries. To enhance visibility of deficit/surplus areas, pixel values were averaged on the surrounding 750 meters.

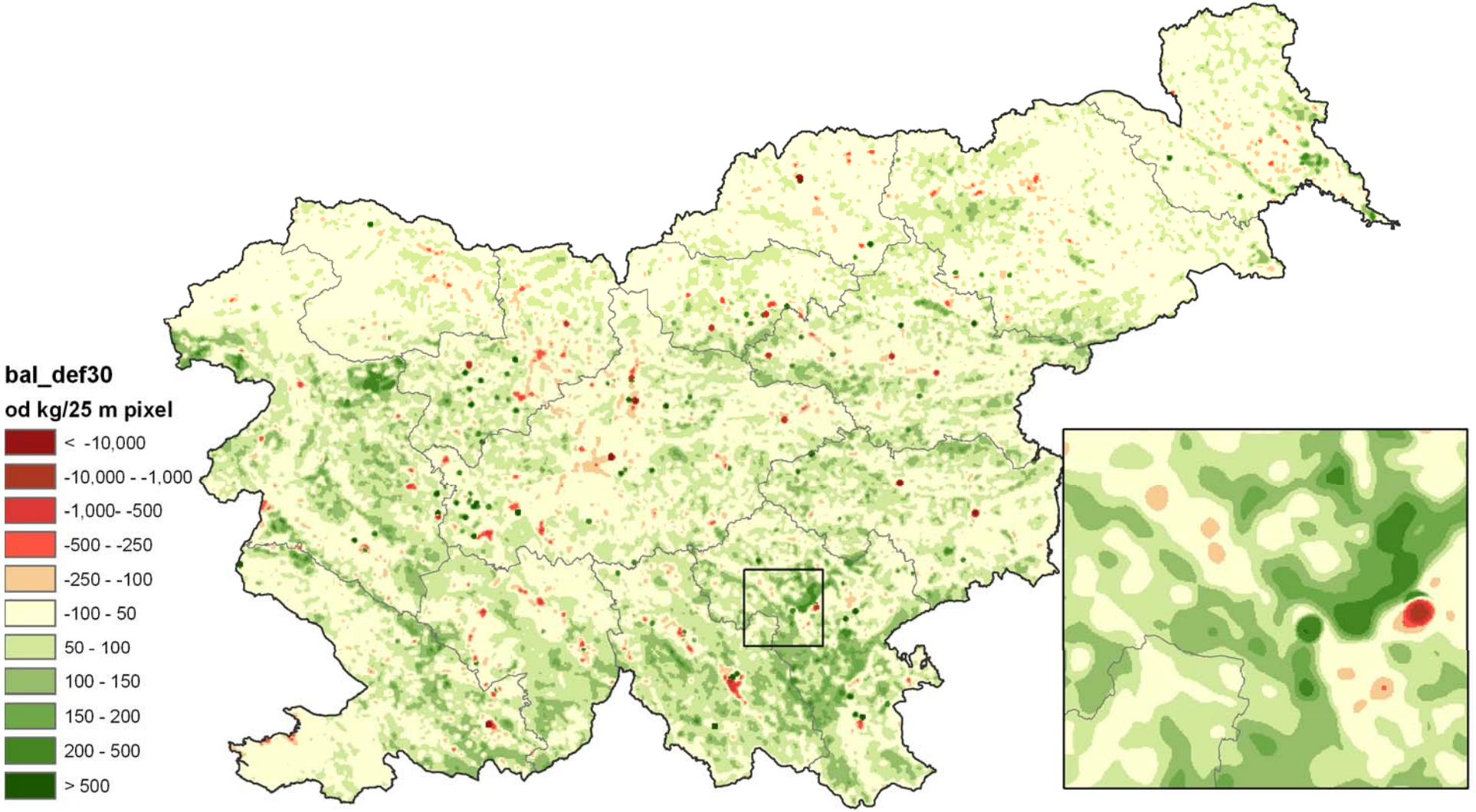
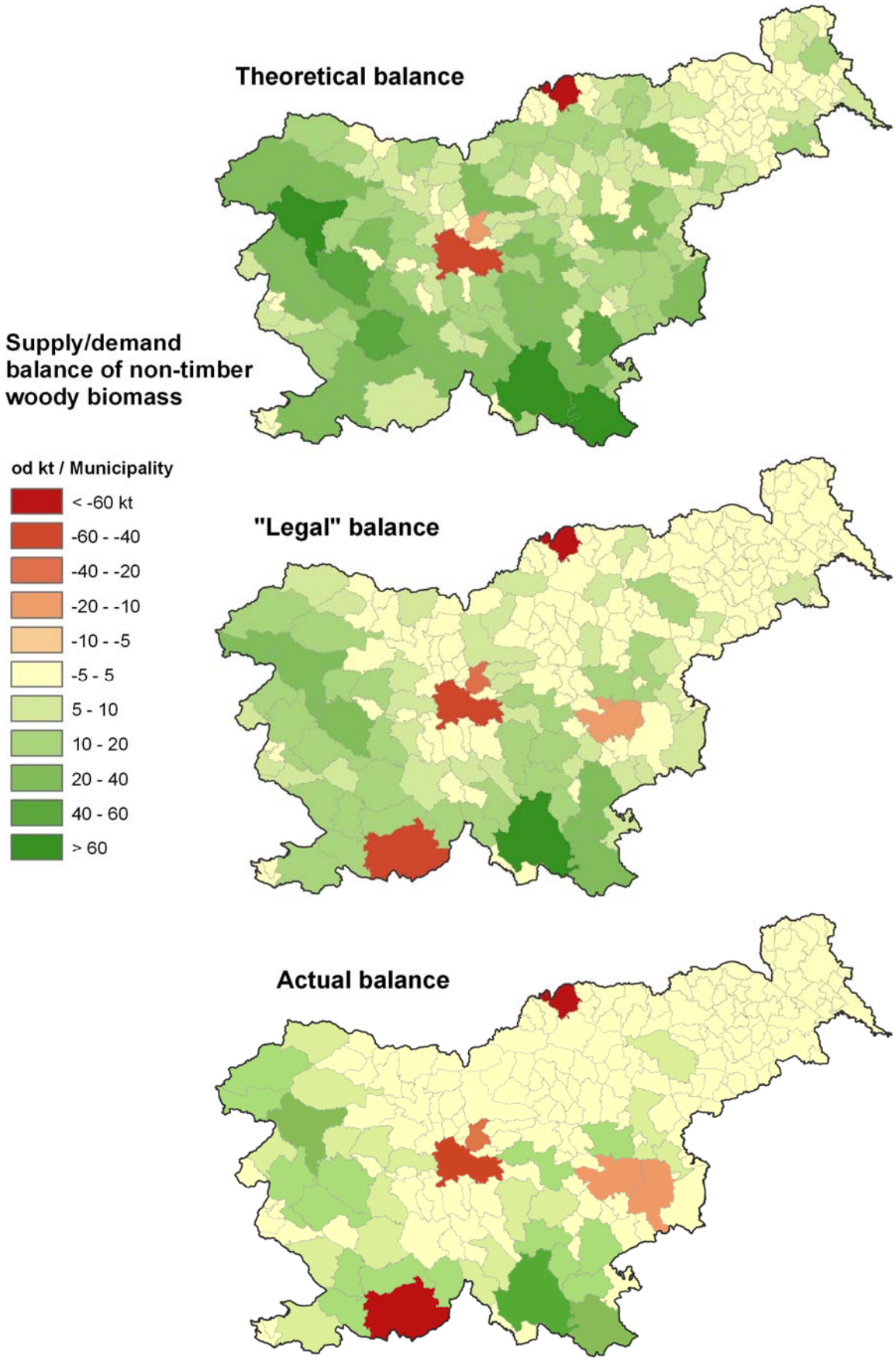


Table 10: Summary supply/demand balance statistics by Forest Regions.

		Theoretical balance	Legal balance	"legal <30"	"legal <26"	"legal <22"	Actual balance	"actual <30"	"actual <26"	"actual <22"
	Supply component	**Annual increment** of non-timber woody biomass + residues	**Legally accessible** non timber woody biomass + residues				**Recorded actual cut** of non timber woody biomass + residues			
	Cost constraints	(none)	(none)	felling&skidding cost < 30 € /m^3	felling&skidding cost < 26 € /m^3	felling&skidding cost < 22 € /m^3	(none)	felling&skidding cost < 30 € /m^3	felling&skidding cost < 26 € /m^3	felling&skidding cost < 22 € /m^3
	Demand component	current consumption for energy and fiber	current consumption for energy and for fiber industries				current consumption for energy and for fiber industries			
	Map name:	bal_mai	bal_de	bal_de30	bal_de26	bal_de22	bal_cut	bal_cut_30	bal_cut_26	bal_cut_22
#	Forest Region	t DM	t DM	t DM	t DM	t DM	t DM	t DM	t DM	t DM
1	Tolmin	314,131	178,056	176,403	169,218	148,574	110,193	109,091	104,298	90,557
2	Bled	82,602	33,075	33,075	33,067	32,427	18,618	18,617	18,613	18,197
3	Kranj	105,020	43,120	43,108	42,964	41,505	15,677	15,669	15,574	14,614
4	Ljubljana	163,434	14,707	14,706	14,059	6,007	-41,568	-41,569	-41,997	-47,335
5	Postojna	157,154	77,533	77,533	77,506	75,857	45,199	45,199	45,182	44,097
6	Kocevje	204,167	118,214	118,050	117,647	115,477	74,595	74,487	74,220	72,787
7	Novo mesto	262,680	150,802	150,582	148,548	140,053	92,549	92,402	91,051	85,414
8	Brežice	153,677	47,971	47,957	47,733	41,048	7,810	7,801	7,652	3,207
9	Celje	177,291	86,527	86,516	86,413	84,112	39,277	39,270	39,201	37,680
10	Nazarje	79,228	33,446	33,437	33,378	32,556	15,722	15,717	15,678	15,143
11	Slovenj Gradec	-3,901	-44,696	-44,696	-44,719	-45,296	-62,422	-62,423	-62,437	-62,813
12	Maribor	203,375	81,530	81,524	81,386	77,913	30,990	30,986	30,893	28,595
13	Murska Sobota	75,657	28,107	28,071	27,944	24,354	5,839	5,815	5,731	3,360
14	Sežana	100,134	5,668	5,638	646	-39,498	-34,331	-34,351	-37,672	-64,311
	SLOVENIA	**2,074,648**	**854,060**	**851,903**	**835,789**	**735,090**	**318,146**	**316,710**	**305,985**	**239,191**

Figure 17: Theoretical, "Legal" and Actual balance by County.



3.4.2 Balance for competing dendroenergy biomass:

In order to clarify what level of competition currently exists between the fiber industries and the energy use concerning feedstock availability, the wood biomass assortments that are suitable for fiber uses[4] were estimated as a separate feedstock category and compared to the current consumption by fiber, particle, tannin and mech.pulp industries.

Table 11 provides an overview of the potential supply of woody biomass suitable to fiber industries from direct (forest compartments) and indirct (sawmills) sources considering both allowable cut and actual cut data vis-à-vis the estimated current consumption by ”fiber” industries. Main conclusions are that:

The total suitable feedstock is between 3.8 and 4.9 times the current demand by fiber industries, which indicates that there is no real competition for the potential feedstock, when considering both direct and indirect sources,

concerning sawmill residues only, there seems to be a real competition because these can satisfy only ¼ of the industrial fiber demand, according to available statistics on the use of residues.

This analysis was limited to the quantity of suitable feedstock currently available. Another issue is the impact of the increasing energy demand and the consequent increase of feedstock prices, which is the main cause of the perceived competition between energy and fiber users.

Table 11: Potential supply of woody biomass suitable to fiber industries vis-à-vis the estimated current consumption by ”fiber” industries.

					Currently available	Legal potential	
		All sawmill residues	currently used for energy	currently used for other industry or unused	Forest "fiber" actually cut + sawmill residues	Allowable cut of Forest "fiber" assortments + sawmill Residues	Consumption by fiber, particle, tannin and mech.pulp industries
	Mapname	res_kg			cutres_fib	acutres_fib	pulp_fib_kg0
	Forest Region	t (dry matter)	t (dry matter)	t (dry matter)	t (dry matter)	t (dry matter)	t (dry matter)
1	Tolmin	7,064	1,047	6,017	110,022	131,484	0
2	Bled	1,840	1,112	728	27,554	41,022	0
3	Kranj	10,286	6,544	3,742	58,311	81,995	0
4	Ljubljana	27,356	14,552	12,804	125,651	172,983	20,090
5	Postojna	2,648	1,078	1,570	56,007	81,274	0
6	Kocevje	20,313	13,011	7,302	98,108	134,367	0
7	Novo mesto	14,829	5,670	9,159	104,150	130,542	0
8	Brežice	7,923	5,402	2,521	71,581	81,156	49,290
9	Celje	10,533	7,312	3,221	91,275	118,300	0
10	Nazarje	5,801	1,985	3,816	36,980	53,370	0
11	Slovenj Gradec	14,571	1,341	13,230	43,921	59,509	86,900
12	Maribor	6,545	5,192	1,353	83,778	105,112	0
13	Murska Sobota	3,511	2,333	1,178	24,007	17,850	0
14	Sežana	8,573	6,286	2,287	38,888	28,950	98,400
	SLOVENIA	**141,793**	**72,865**	**68,928**	**970,232**	**1,237,915**	**254,680**
					= 3.8 x fiber use	= 4.9 x fiber use	

[4] See Annex 3 : Wood assortments suitability for competing non-energy uses

3.5 Woodshed analysis

3.5.1 Definition of sustainable supply zones

Once the development of the WISDOM Base is complete and the commercial balance maps are available, it is possible to outline the potential sustainable woodfuel/biomass supply zones of specific consumption sites (existing or hypothetical) keeping into account the consumption of surrounding urban and rural areas as well as the resources realistically available.

According to the scope and the geographic scale of the study, woodshed analysis can be applied to consumption sites that depend on commercial supply systems, such as cities and biomass plants (existing or planned), or to smaller consumption sites that depend on non-commercial supply of woodfuels, such as rural villages. In the first case the analysis considers the commercial woodfuel surplus only while in the second case the entire woodfuel surplus is considered.

Concerning urban and industrial sites consuming large quantities of woodfuels (or agrofuels), the supply sources are often at great distance and woodshed analysis is essential for defining the areas and the biomass sources that need to be managed in order to assure the sustainable production of the needed woodfuel quantities. This is the most important context of application of woodshed analyses and it is with reference to such context that the procedure of analysis was developed.

The estimation procedure for determining the woodshed of a selected consumption site is to progressively expand the area around such site until the cumulative value of the commercial balance reaches a positive value, indicating that within such territory the supply potential (i.e. the commercial surplus) matches the demand.

The procedure includes the analysis of accessibility of the selected consumption site and the progressive evaluation of the cumulative commercial balance within the accessible layers around the selected site.

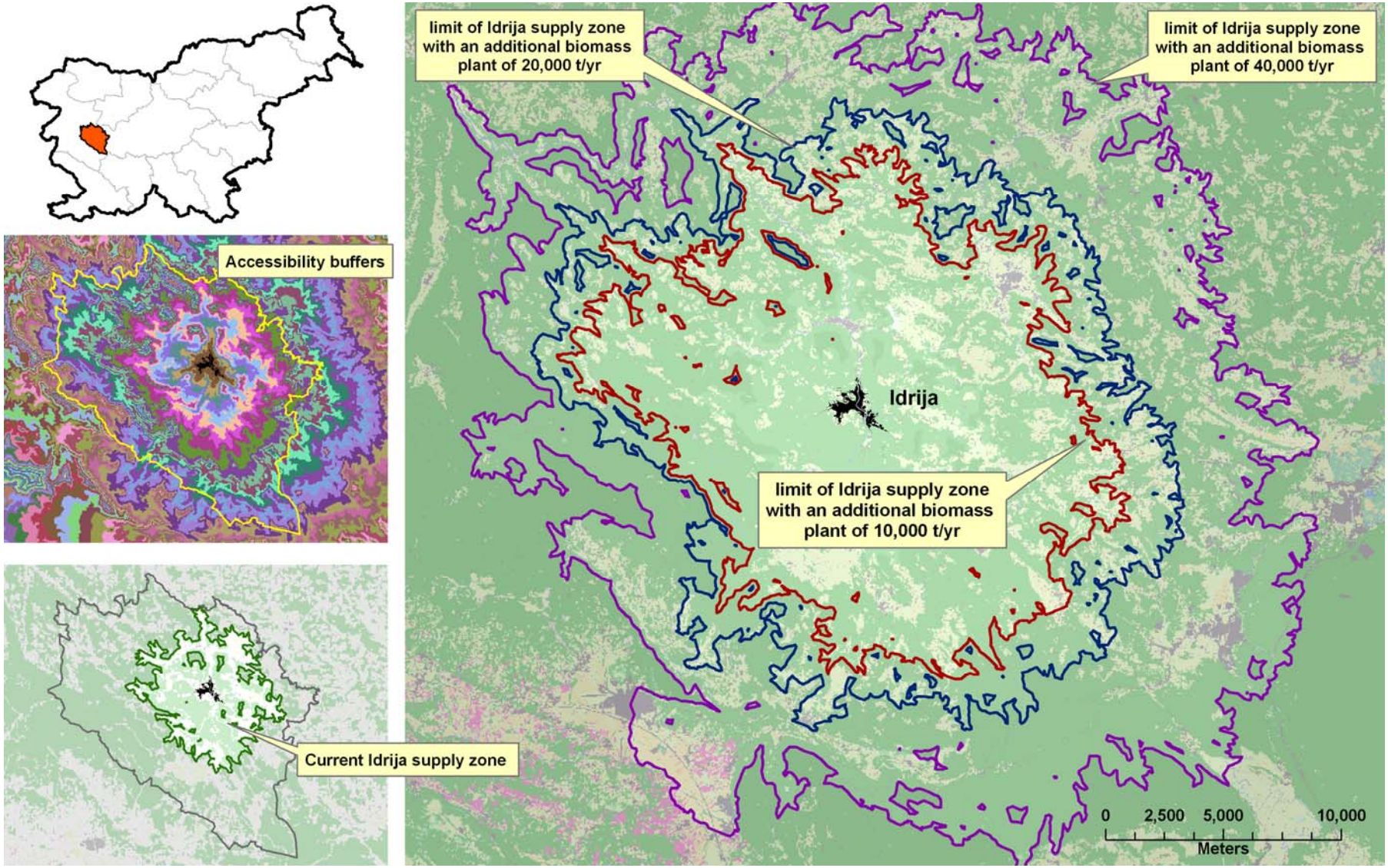
The accessibility of the selected site (that could include one or several locations) is analyzed with a cost-distance function. The analysis starts from the selected site using as *cost* the physical accessibility map already produced for the entire territory and as *distance* the distance from the selected site. The resulting continuous-value cost-distance map is then segmented into buffers defining iso-accessible zones.

The second step is to calculate the commercial balance within each accessibility buffer zone. This is conveniently done with a zonal statistics function that uses as *zone* the accessibility buffers map and that calculate the *statistics* from the commercial balance map (algebraic sum of cell values).

The third step consists in quantifying the cumulative commercial balance, starting from the selected site and progressively including the accessibility zones until the overall balance becomes positive. Since in most cases there is more than one commercial balance map (to represent minimum, medium and maximum supply variants, for instance, or alternative scenarios), the second and third steps are repeated for all such maps in order to delineate the woodsheds relative to the various scenarios considered.

Figure 18 shows an example of woodshed analysis appied to Idrija (Tolmin Forest Region) assuming the creation of biomass plant(s) near the town with annual processing capacities of 10,000, 20,000 and 40,000 t (dry matter) of woody biomass. The details of the buffer zones around Idrija and balance calculations are presented in Annex 13.

Figure 18: Example of woodshed analysis for Idrija.



3.5.2 Analysis of suitable locations for woody biomass plants

Supply/demand balance data is also used to define the suitable locations for biomass plants. In this case the locations for hypotetical plants are not defined preliminarily as for the woodshed analysis presented above. In this case the analysis is done at once over the entire country and the scope is to determine the supply potential of each map pixel assuming a certain supply radius.

Since the map processing is very demanding from a computational view point, the analysis was done on the basis of balance maps resampled at 500 m cell size, with relative value expansion (400 x).

The supply distance assumed in the analysis shown in Figure 19 is 30 km, which may be considered as the convenient radius of supply for a medium-size plant. The analysis can be done assuming different supply distances.

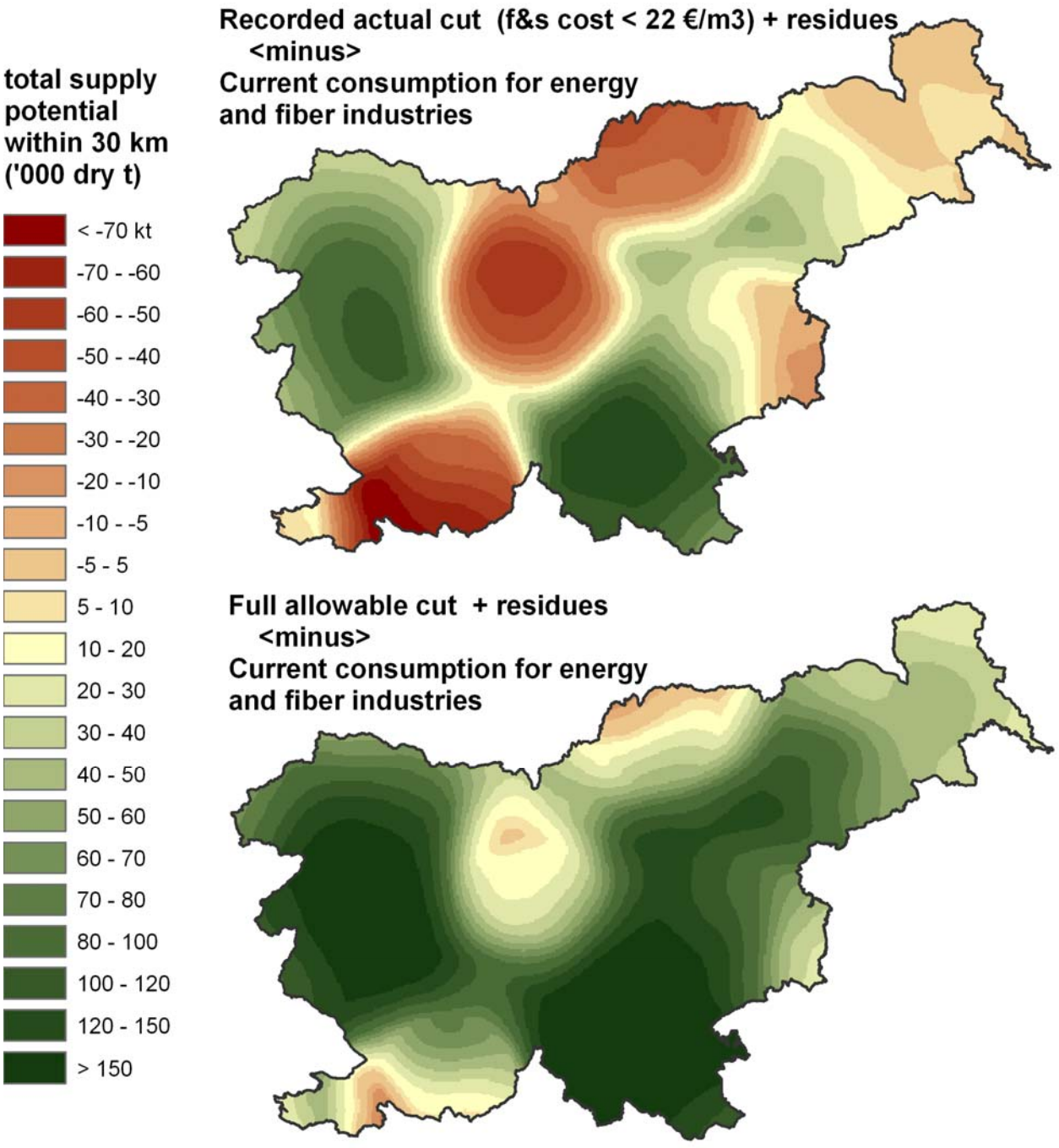
The process implies the algebraic sum of the balance values of the raster cells within a radius of 30 km (60 cells of 500 m). The resulting cell values indicate the cumulative balance, which may be positive (a net surplus) or negative (net deficit). The surplus values are indicative of the total amount of woody biomass that may be supplied from the surrounding 30 km to feed a new hypotetical plant.

Two supply scenarios are shown in Figure 19:

- The supply/demand balance based on the recorded actual cut with felling&skidding cost < 22 €/m^3 (“actual <22” in Table 9 above), which may be considered a conservative representation of today’s situation.
- The balance based on the full legally accessible resource (“legal balance” in Table 9 above) which is a realistic sustainable target, especially considering that the management prescriptions for the next decade will certainly raise the allowable cut significantly.

Clearly, once a new plant with a given biomass consumption capacity is located in the map the situation changes and the map must be recreated on the basis of the new supply/demand context.

Figure 19: Analysis of suitable locations for woody biomass plants. Supply



5. Conclusions and recommendations

At the beginning of the review of the existing knowledge, it became evident that the new information that could be considered useful for the update and upgrade of the Slovenia WISDOM geodatabase was very copious. This included a new and extremely detailed land cover map, new forestry data, new map of Slovenia buildings, new data on industries and CHP plants, etc..

This wealth of data imposed a moral obligation to its use and, inevitably, to the considerable amount of work necessary to its procurement, processing, harmonization, etc. In fact, more than a "simple" revision of the existing information system, the activity ended up to imply a total rebuilt of WISDOM's Supply and Demand Modules on totally new basis.

Inter-institutional WISDOM Team

Bioenergy is deeply inter-sectoral and interdisciplinary. Consequently, the WISDOM approach is based on information from the forestry sector, for which the SFS is the major data source, as well as from agriculture, energy, statistical office, economy, industry etc.

Bioenergy is a new policy item for the institutions and governing bodies now called to develop it in accordance with EU Directives but the information so far available is fragmented and incomplete.

To overcome this barrier, a good level of collaboration with the many institutions that did or may contributed to WISDOM development is an important institutional condition.

In several other countries where WISDOM was implemented a "WISDOM Team" was westablished, representing the SFS and the other institutions concerned with the development of the WISDOM information system and interested in the subsequent use of its products.

The WISDOM Team could be developed/established as one of the project's stakeholders groups. In fact, the WISDOM Team represents the stakeholders that share the interest/responsibility of bioenergy planning, while other stakeholders groups would be focused on biomass production (forest owners, landscape managers, etc.) or biomass use (technology developers, biobusiness developers, etc.).

For smooth inter-institutional synergies the transparency of data handling is essential, as it is essential to share the results of the analytical process for validation. Hypothesis and assumptions must always be clearly stated and all constructive critics are well accepted. This process leads to a shared responsibility on the final product. In a Team context each participant is responsible for the data and knowledge relative to his area of competence.

For this, it is recommended to establish a "WISDOM Team" representing the SFS and the other institutions concerned with the development of the WISDOM information system and interested in the subsequent use of its products. In order to be efficient, the WISDOM Team should present two levels:

- Policy/institutional level. This is where the scope of the collaboration is defined and the levels of data sharing and institutional/technical synergies are decided. Members of this level are the responsible representatives of the key institutions and agencies.
- Technical level. This level is composed by experts in the various sectors/disciplines representing the technical units of the participating institutions and agencies.

Concerning WISDOM maintenance and data:

In order to cope with the level of ambition determined by the existing data relative to the productivity and consumption of biomass for energy, it is recommended that the SFS dedicate the adequate level of technical and institutional resources to the task.

The geospatial dataset of the new WISDOM and some of its processing steps are different from the GIS work normally conducted at the SFS. In order to assure adequate GIS processing and data handling capacities it is recommended to acquire GIS software capable to operate with both vector and raster data and to provide the SFS staff concerned with the development and use/consultation of the WISDOM dataset with the necessary level of training.

In order to facilitate and standardize the update of supply data it is recommended to consolidate and streamline the database processing system (from SFS forestry data to WISDOM Compartment attribute tables). For instance, program names (i.e. KOSORTIX is no longer at KO level and should be named COMPSORTIX or similar) and fieldnames in database programs should be modified in order to facilitate the update of WISDOM parameters on the basis of new management plan details.

The data layers that deserves further attention may be summarized as follow:

- Supply Module
    - Recovered woody biomass
    - Import and export of biomass for energy (from SSO sources)
- Demand Module
    - Industrial consumption other than wood processing industry
    - Consumption by the commercial sector (restaurants, pizzerias, bakeries, etc.)

Other aspects that can be analized with priority based on the available WISDOM data:

- Ownership fragmentation and actual vs. allowable cut
- Sylvicultural requirements & biomass potential

References

To be completed with SLOVENIA REFERENCES and others

Jackson R.B., J. Canadell, J.R.Ehleringer, H.A. Mooney, O.E. Sala and E.D. Schulze. 1996. A global analysis of root distribution for terrestrial biomes. Oecologia (1996) 108:389-411. Springer-Verlag 1996.

Kotar, 2003. Slovenia Forestry Manual

Drigo R. and F. Salbitano. 2008. WISDOM for Cities. Analysis of wood energy and urbanization aspects using WISDOM methodology. FAO Forestry Department. Urban forestry – Wood energy. FAO. (in English and French) English version: http://www.fao.org/docrep/010/i0152e/i0152e00.htm

Drigo R. and Ž. Veselič. 2006. Woodfuel Integrated Supply / Demand Overview Mapping (WISDOM) - Slovenia - Spatial woodfuel production and consumption analysis. FAO Forestry Department – Wood Energy Working Paper. FAO. See: http://www.fao.org/docrep/009/j8027e/j8027e00.HTM

Drigo R., G. Chirici, B. Lasserre and M. Marchetti. 2007. Analisi su base geografica della domanda e dell'offerta di combustibili legnosi in Italia. (Geographical analysis of demand and supply of woody fuel in Italy). In: L'ITALIA FORESTALE E MONTANA, Anno LXII - numero 5/6, settembre-dicembre 2007. P. 303-324.

Drigo R., N. Campanero, F. Rodríguez y M. Broto. Editing M. Martin Larrañaga. 2009. *WISDOM Castilla y León - Evaluación de recursos leñosos para usos energéticos*. Project GDCP/INT/001/SPA Coordinated by M.Trossero, Departamento Forestal Servicios y Productos Forestales – Dendroenergía. FAO

Drigo R., O.R. Masera and M.A. Trossero. 2002. Woodfuel Integrated Supply/Demand Overview Mapping – WISDOM: a geographical representation of woodfuel priority areas. Unasylva Vol. 53 2002/4, pp 36-40. FAO. (Available in English, Spanish and French) See: http://www.fao.org/docrep/005/y4450e/y4450e12.htm

FAO. 2004. UBET – Unified Bioenergy Terminology. See: http://www.fao.org/docrep/007/j4504E/j4504e00.HTM

Masera, O.R., R. Drigo and M. Trossero. 2003. Woodfuels Integrated Supply/Demand Overview Mapping (WISDOM): A methodological approach for assessing woodfuel sustainability and support wood energy planning FAO Report TCD/D/Y4719E/1/6.03/1000, Wood Energy Program, Forest Products Division, FAO, ROME, March, 44 pp. http://www.fao.org/DOCREP/005/Y4719E/Y4719E00.HTM

Kovač, Štefan. 2006. Les – od gozda do peči. GEF Project "Ostranitev ovir za povečano izrabo lesne biomase kot energetskega vira".

Krajnc N., M. Piškur, T. Premrl and M. Mihelič. 2010. Report on bioheat from solid biomass – Slovenia. Project Agri-for-Energy 2 - Work Package 2: Bioheat From Solid Biomass. Slovenian Forestry Institute

"Agri for energy" Project: docs and data :

- D2 1_Regional report_on heat from biomass_SFI_Slovenian.pdf
- sellers_buyers_SI tp (docx & pdf)
- SPTE_DO.xlsx
- D3.1_Regional report on PVP_SFI_Slovenian.pdf

- regional report biogas and biomethane_sfi_slovenian-1.pdf

Annexes

Annex 1: Land use map of Slovenia – class features

Name_SLO	RABA_ID	Name_ENG	Min mapping area	AREA_ha	Pixel COUNT	Area_raster ha
Njiva	1100	Fields	(1000 m2)	182,523	2,918,495	182,406
Hmeljišče	1160	Hops fields	(500 m2)	2,049	33,018	2,064
Trajne rastline na njivskih površinah	1180	Fields with permanent plants (nurseries, asparagus, etc.)	(1000 m2)	310	4,902	306
Rastlinjak	1190	Greenhouse	(25 m2)	110	1,734	108
Vinograd	1211	Vineyard	(500 m2)	22,315	358,320	22,395
Matičnjak	1212	Vine fields for grape nurseries	(500 m2)	44	614	38
Intenzivni sadovnjak	1221	Intensive orchard	(1000 m2)	4,606	76,096	4,756
Ekstenzivni oziroma travniški sadovnjak	1222	Extensive orchard or meadow orchard	(1000 m2)	21,445	342,179	21,386
Oljcnik	1230	Olive trees orchard	(500 m2)	1,781	25,994	1,625
Ostali trajni nasadi	1240	Other agricultural plantations	(500 m2)	335	5,280	330
Trajni travnik	1300	Permanent meadow	(1000 m2)	371,588	5,946,707	371,669
Barjanski travnik	1321	Swamp meadow	(1000 m2)	6,411	103,679	6,480
Kmetijsko zemljišce v zarašcanju	1410	Re-growth on old farmland	(1000 m2)	20,743	355,740	22,234
Plantaža gozdnega drevja	1420	Forest plantation	(1000 m2)	323	5,280	330
Drevesa in grmičevje	1500	"Belts of trees and bushes"	(1000 m2)	17,981	297,446	18,590
Neobdelano kmetijsko zemljišce	1600	Agricultural area under preparation	(1000 m2)	2,748	40,352	2,522
Kmetijsko zemljišce, poraslo z gozdnim drevjem	1800	Grass meadows (over 80 % of area) with forest trees	(1000 m2)	9,488	119,713	7,482
Gozd	2000	Forest	(2500m2)	1,213,945	19,458,041	1,216,128
Pozidano in sorodno zemljišce	3000	Urban and built up areas, roads	(25 m2)	107,178	1,714,962	107,185
Barje	4100	Swamp	(5000 m2)	65	1,043	65
Trstičje	4210	Reeds	(5000 m2)	82	1,754	110
Ostalo zamočvirjeno zemljišce	4220	Other water logged areas	(5000 m2)	1,310	19,456	1,216
Suho, odprto zemljišce s posebnim rastlinskim pokrovom	5000	Dry areas with special vegetation cover	(5000 m2)	16,481	262,023	16,376
Odprto zemljišce brez ali z nepomembnim rastlinskim pokrovom	6000	Barren land without grasses	(5000 m2)	12,411	206,050	12,878
Voda	7000	Water bodies	(25 m2)	13,910	223,590	13,974
				2,030,182	32,522,468	2,032,654

Annex 2: Main layers, variables and data sources of WISDOM modules

This comprehensive table constitutes the "WISDOM road map" and represents the main reference in the development of the modules. In order to keep track of the many operational and procedural details it is essential to maintain this table up-to-date at all times.

Module /phase	Layer/ parameter	Variables	Source de information & remarks	Procurement & processing	Mapping & Spatial analysis	Comments
Spatial base		Projection:				
		Raster resolution: 25 m cells				
	Map administrative (vector)	Compartments KO Obcina Regions				
	Land cover	RABA_20100125.shp	available			
		asciito_land1 <renamed> LU_2010.grd 25m raster	available	created from RABA_20100125.shp on RABA_ID		
Spatial analysis (pix. 25m)	DTM		available	to be converted in GRID		
	DTM_slope		available			
	Roads		available			
	buildings		available			
	Crop maps		available	to be converted in GRID		
	Protected areas		???			
Supply Module	Direct sources					

	Forest cover	Compartments map: SLO_ODS_2009_celi_region.shp	available, corresponds to class 2000 (forest) of LU_2010			
		comp_09.grd	available	created from SLO_ODS_2009_celi_region.shp on Kljuc_ods (text ID)		
	Land cover reference					
	WISDOM LAND COVER BASE					Created LC_
	Stock	Gross volumes over bark of all trees above 10 DBH including stem and branches above 7 cm D	Check about stump volume (Dragan). Stump is considered as excluded			
		Volume – biomass expansion factors and values allocation to forest classes	Find references on volume by tree components by species (Dragan).			
	Productivity	Gross volumes over bark of all trees above 10 DBH including stem and branches above 7 cm D (stump included ??)	Check about stump volume (Dragan). Stump is considered as excluded			
		Volume – biomass expansion factors and values allocation to forest classes	Find references on volume by tree components by species (Dragan ?).			
	NON-energy use	Timber assortments	Timber assortment are deducted from compartment-level stock and increment data			
		Assortments for fiber, particle board, mechanical pulp and tannin	Preference of woody assortments and actual consumption for these non-energy uses is defined in order to assess competition with energy uses.	Small questionnaire prepared that Mitja Piskur will send to contact persons at the industries . See ANNEX _.		
	Woody biomass	Missing new specific data,				

	stock and productivity of NON-Forest lands	reference is made to the non-forest survey carried out in 2005.				
	Other biomass from crop harvesting residues	Simple approach: Area of crops by obcina;	Data from Slovenia Chamber of Agriculture and Forestry through ACTUM (2006):			NOTE: Available data refer only to subsidized crops !!! This data is used to determine the proportions of crops (including set aside) to be applied to the entire LU class 1100 .
		<u>Alternative approach:</u> Actual crop areas field by field for 2009, 2008, etc.	Alternative approach: Use available GERK map; request actual crop data from GERK for 2009 and before using individual field area codes.	New GERK data to be requested to Min of Agriculture.		NOTE: Available data refer only to subsidized crops !!! This data is used to determine the proportions of crops (including set aside) to be applied to the entire LU class 1100 .
		residues production per ha;	residues production by crop type	ACTUM		
		usable fraction of residues per ha	Look for sources			
	Indirect sources					
	Residues from forest industries	Geographic distribution of the forest industries (sawmills, other wood processing;	SFS data (Andrej) and Mitja data is harmonized/completed by Mitja and will be provided by 30 April			
		Processed material; products stats;	SFS data (Andrej) and Mitja data is harmonized/completed by Mitja and will be provided by 30 April			
		Estimation of residues generated (fraction of processed wood or final product)	SFS data (Andrej) and Mitja data is harmonized/completed by Mitja and will be provided by 30 April			
	Residues from agro- industries	Residues by obcina including agro-food-industries and slaughterhouses	Available Data from Slovenia Chamber of Agriculture and Forestry through ACTUM			
	Recovered woody biomass	Pallets; Construction wood;	SSO wastes<statistics by waste type.			

Demand Module	Household consumption					
		Dwelling surface heated by woodfuels	2008 census of buildings done by REN (Registry of buildings of Slovenia) ; text files available with Rok;	REN questionnaires to be procured and text data to be processed for: updated hh surface heated by biomass fuels by building or KO. NOT POSSIBLE BECAUSE NO DATA ON FUELS WAS COLLECTED		
			Minimal alternatives: use WISDOM 2005 data by KO adjusting the 2002 values with: a) pop growth by obcina (SSO for 2009 1st semester); b) use total buildings' surface in 2002 and values of 2009 map of buildings (Survey and Mapping Authority of Sl.)	a) pop projection stats by obcina available; b) map of buildings available (SURFACE IN THE TWO 2002 AND 2009 MAPS MAY BE NON COMPARABLE – LIVING SURFACE vs TOTAL SURFACE ??)		
		Consumption of fuelwood and charcoal per capita (per household) in rural and urban areas;	Energy requirements by m2 in climatic zones; Climatic zones can be based on ARSO (Agency for Environment) (map available)	Find references on energy requirements by m2 in different climatic areas. Check Energy Directory of Min of Energy (Andrej contact???)		
		Energy sources for cooking (Electricity, wood, charcoal, biomass, other)	Review the 30% of heating value applied in 2005.	Check references 20%?? Rok says 25% Rok's grandmather cooks with wood even in summer		
		Demographic data	Last census (2002?)	Obcina data available in WISDOM 2005		
			Projections : pop growth by obcina (SSO for 2009 1st semester) Nat level: ref from M. Suvorov http://www.stat.si/novica_prikazi.aspx?id=2850	SSO 2009 data available		

	Consumed by industrial processes	Consumption of woody biomass (residues) by the forest industries				
		Consumption of woody biomass by agro-food industry and other industries				
		Consumption of woody biomass by energy systems (H, P, CHP)	SFI Nike/ Tine Premrl / Jaka Klun. "Agri for energy" Project docs and data : - D2 1_Regional report_on heat from biomass_SFI_Slovenian.pdf - sellers_buyers_SI tp (docx & pdf) - SPTE_DO.xlsx	Extract useful report data and ask Jaka Klun for GIS data		
		Consumption of other biomass by energy systems (i.e. biogas plants for H, P, CHP)	SFI Nike/ Tine Premrl / Jaka Klun. "Agri for energy" Project docs and data : Pure vegetable oil = - D3.1_Regional report on PVP_SFI_Slovenian.pdf Biogas = - regional report biogas and biomethane_sfi_slovenian-1.pdf			
	Consumption in the Commercial sector	Commercial services; Restaurants (Grills) Bread making				
	Consumption in the Public sector	Schools; Hospitals; Prisons; Etc.				

Annex 3: Wood assortments suitability for competing non-energy uses

		Suitability of feedstock				Approximate % of current supply				Approximate quantities ('000 od t)			
		Fiber	**Particle board**	**Mechan. pulp**	**Tannin**	**Fiber**	**Particle board**	**Mechan. pulp**	**Tannin**	**Fiber**	**Particle board**	**Mechan. pulp**	**Tannin**
DIRECT sources (forest compartments)		1 =preferred, optimal; 2=Suitable; 3=Unsuitable				%				'000 od t			
Stem w/bark to 7cm D													
non-timber assortments of coniferous spp (all spp)													
non-timber assortm. of conif. spp (Larix excluded)		**1**	**1**	**1**	3	30	20	99		24	14.4	39.6	
non-timber assortments of larix decidua only		3	3	3	3								
most suited conif. spp: Picea abies		*1*	*1*	*1*									
least suited conif. spp: Pinus		*3*	*2*	*3*									
non-timber assortments of broadleaved spp (all spp)													
non-timber assortments of quality hard Broadleaved spp		**1**	**1**	3	**1**	50	10		100	58.4	10.5	0.0	29.2
most suited hard broadl. spp: Fagus		1	1		Castanea /Quercus								
least suited hard broadl. spp:													
non-timber assortments of soft Broadleaved species		3	3	2				1				0.6	
most suited soft broadl. spp: Populus		*3*	*3*	*2*									
least suited soft broadl. spp:													
top & branches w/bark to ~3 cm D													
non-timber assortments of coniferous spp (all spp)													
non-timber assortments of coniferous sppp (Larix excluded)		3	3	3	3								
non-timber assortments of larix decidua		3	3	3	3								
non-timber assortments of broadleaved spp (all spp)													
non-timber assortments of quality hard Broadleaved spp		3	3	3	3								
non-timber assortments of soft Broadleaved species		3	3	3	3								
INDIRECT Sources (industries)													
Residues from Sawmill & Furniture industries						20	70			16.0	62.0		
Coniferous	sawdust & cuttings with bark	**1**	**1**	3	3								
	sawdust & cuttings without bark	**1**	**1**	3	3								
Broadleaved	sawdust & cuttings with bark	2	**1**	3	3								
	sawdust & cuttings without bark	2	**1**	3	3								
ESTIMATES (!!!) of raw material input		'000 od t		**255**						**98**	**87**	**40**	**29**
		'000 m^3 equivalents		**530**						**200**	**180**	**100**	**50**

Ref: based on UNECE production data and EFSOS conversion factors for m3 roundwood equivalent and Slovenia National Inventory Report for oven-dry wood density values

Annex 4. SFS databases

Fields of the database **FOND1x.dbf**, which summarizes forest compartments' information (approx. 65000 records)

	Compartment	
KO	Cadastral Community	
TOTAREA	Total forest area	
EXPLAREA	Exploitable area (legal factors) include only categories 1 and 2	
ACCESS_1	slope <30% dist. < 400 m	
ACCESS_2	slope <30% dist 400-800 m	
ACCESS_3	slope <30% dist. > 800 m	
ACCESS_4	slope >30% dist. <400 m	
ACCESS_5	slope >30% dist 400-800 m	
ACCESS_6	slope >30% dist. > 800 m	
OW2	private property	
OW3	property of other officials (mainly religious institutions)	
OW5	state property	
OW6	property of civil (rural) community	
ASOC1	Code of association 1 (see list of species associations)	
ASOC1AR	area of association 1	
ASOC2	=	
ASOC2AR	=	
ASOC3	=	
ASOC3AR	=	
ASOC4	=	
ASOC4AR	=	
ASOC5	=	
ASOC5AR	=	
ASOC6	=	
ASOC6AR	=	
ASOC7	=	
ASOC7AR	=	
ASOC8	=	
ASOC8AR	=	
ASOC9	=	
ASOC9AR	=	
STOCK1	Stocking of diameter class 1	10-30
STOCK2	Stocking of diameter class 2	30-50
STOCK3	Stocking of diameter class 3	> 50
STOCKTOT	Total stocking	
INCR1	Increment of diameter class 1	10-30
INCR2	Increment of diameter class 2	30-50
INCR3	Increment of diameter class 3	> 50
INCRTOT	Total increment	
CUT	Fraction of allowable cut actually cut	
YYEAR	Year of last survey	
PH1AR	area of phase dev. 1	
PH2AR	=	
PH3AR	=	
PH4AR	=	
PH5AR	=	
PH6AR	=	
PH7AR	=	
PH8AR	=	
PH9AR	=	
PH10AR	=	

Code	phase development
01	SEEDLINGS
02	EARLY POLE STAGE
03	LATE POLE STAGE
04	TIMBER TREE
05	REGENERATION FOREST
06	SELECTION FOREST
07	COPPICE
08	FORMER COPPICE
09	LITTER FOREST
10	BUSH FOREST

NOTE: Stock and Increment values refer to trees above 10 cm DBH and include over bark volume of stem and branches with diameter above 7 cm. Stump is excluded

SPGR_1T	Species group 1 (conifers ex. larix) timber assortments
SPGR_1O	Species group 1 (larix) other assortments (incl energy use)
SPGR_2T	Species group 2 (hard broadleaves) timber assortments
SPGR_2O	Species group 2 (hard broadleaves) other assortments (incl energy use)
SPGR_3F	Species group 3 (hard broadleaves) fuelwood use only
SPGR_4T	Species group 4 (soft broadleaves) timber assortments
SPGR_4O	Species group 4 (soft broadleaves) other assortments (incl energy use)

Fields of file **KOSORTIX.dbf**, which summarizes forest compartments' information on wood products assortments at cadastral community level according to management plans' 10-years allowable cut.

KO	Cadastral community
GRP	Species grouping under wood energy perspective (see below)
GRPTREE	Tree group code (see below)
GRPNAME	Tree group name (see below)
SORTIM	Main assortment types (see below)
GRPSORT	Assortment grouping under wood energy perspective (see below)
NETOM3	Net volume of 10-year allowable cut
BRUTOM3	Gross volume of 10-year allowable cut
PERCENT	Assortment as percent of GRPTREE total allowable cut

GRP	**GRPTREE**	**GRPNAME**
A	11	Spruce tree (Picea abies)
A	21	Fir tree (Abies alba)
A	30	Pine tree (Pinus silvestris, P. nigra)
B	34	Larch (Larix decidua)
A	39	Other Conifers
C	40	Beech tree (Fagus silvatica)
C	50	Oak tree (Quercus robur, Q.sessiliflora, Q. rubra)
C	55	Chestnut tree (Castanea sativa)
C	60	Quality broad leaved trees (Acer pseudoplatanus, Fraxinus excelsior, Tilia cordata,Ulmus sp.,Prunus avium, Juglans)
D	70	Other hard broad leaved trees (Carpinus,Ostrya,Fraxinus ornus,Robinia, Acer campestre,Sorbus, Quercus pubescens)
E	80	Other soft broad leaved trees (Betula,Salix,Laburnum alpinum)
E	90	Poplar, Black Alder (Populus sp., Alnus glutinosa)

GRPSORT	**SORTIM**
T	Log-Timber I
T	Log-Timber II
T	Log-Timber III
T	Log-Timber
O	Other Timber
O	Cellulose Timber
O	Cord Wood
F	Fuel Wood

SPP Groups considered:

- Coniferous species (Larix excluded)

- Fuelwood assortments (selected hard Broadleaved species)
- Quality hard Broadleaved species
- Larix decidua
- Fuelwood species commonly used (group BCD)
- Soft Broadleaved species

Main parameters relative to “total volume” values reported in SFS forestry databases:

- gross volume over bark
- minimum DBH diameter (DBH >= 10 cm); all trees below 10 DBH are not considered;
- minimum top diameter (DT >= 7 cm)
- minimum branch diameter (DB >= 7 cm)
- stump excluded

Annex 5. Tree component factors

	Slovenia average DBH (cm)	woody biomass below 7cm D (% of gross volume =>7cm)[1]	leaves[2] (% of aboveground woody biomass)	root/shoot ratio		
Ref:	Forestry database	Adapted from Slovenia Forestry Manual	Chungjiang, et al. 2009	Jackson et al. 1996[3]	Paladinic et al. 2009[4]	Chungjiang, et al. 2009
Spruce tree (Picea abies)	22.3	19	6.2-6.9			0.12
Pinus sylvestris			2.1-2.4			0.15
Other conifers (all except spruce)	24.8	17.5			0.32	
All conifers		18.25		**0.18**		
Beech tree (Fagus silvatica)	20.6	18				
Other broadleaves (all excluded fagus)	18.7	18.5				
All broadleaves		18.25		**0.23**	0.24-0.35	
All species		**18.25**				

[1] Slovenia Forestry Manual (Kotar, 2003)

[2] Chungjiang, et al. 2009 (GET FULL CITATION)

[3] Jackson R.B., J. Canadell, J.R.Ehleringer, H.A. Mooney, O.E. Sala and E.D. Schulze. 1996. A global analysis of root distribution for terrestrial biomes. Oecologia (1996) 108:389-411. Springer-Verlag 1996.

[4] Referred to Abies alba only

Wood density factors applied:

Factors applied for broad groupings:

	Oven-dry (0% moisture) kg * $m^{3\,-1}$	Air-dry (12-15% moisture) kg * $m^{3\,-1}$
Conifers (majority *picea abies*)	400	470
Broadleaves (majority *fagus sylvatica*)	584	720

Ref: Slovenia National Inventory Report for oven-dry wood density values

Other refs :Brno study on fagus gives 752 kg /m^3 air dry (approx 660 od kg /m^3)

Annex 6. Geodatabase of Compartment-level forestry data

(from file: SLO_ODS_CODE3d.xls ref.: map comp2009.shp in geodatabase comp09_d.mdb

Fieldname of comp2009_d	Summary value	Unit	Description	Formula
COM_Count		n	sequential compartment counter	
REG		text	Regional code	
C_CODE		text	Compartment code within region	
COMP_COD		text	Region&compartment code (unique)	
Kliuc		text	Kliuc code derived by comp_cod (first 4 digits)	
KO_code		text	Code of Kadastral Obcina (KO), text	
UE_code		text	County (Uprabna Enota) 58 units	
OB_code		text	County code 210 (units)	
HUNT_CLUB		text	Hunting clubs	
HUNT_SPEC		text	Hunting reserve with special purpose	
SFS_DIST		text	SFS Forest District unit (409 units)	
FORCAT		text	Forest category	
MANDETAIL		text	Detailed forest management class for management unit	
MANREG		text	Forest management class for regional unit	
NATURALNES		text	Naturalness	
ALT_MIN		m	height above sea level - from	
ALT_MAX		m	height above sea level - to	
LANDSCAPE		text	position in landscape (4 classes)	
RELIEF		text	Relief (4 classes)	
ASPECT		text	Aspect (9 classes)	
SLOPE		Deg	Slope (degrees)	
GEO_LITO		text	Geology - Litology (39 classes)	
ROCKS		n	% of loose rocks on surface	
BEDROCKS		n	% of bedrocks on surface	

T1		text	Code of Tarif used for spp T1 (spruce)
T2		text	Code of Tarif used for spp T2 (abies alba)
T3		text	Code of Tarif used for spp T3 pinus & larix
T4		text	Code of Tarif used for spp T4 beech et al.
T5		text	Code of Tarif used for spp T5 quercus & castanea
T6		text	Code of Tarif used for spp T6 acer & ulmus & tilia
T7		text	Code of Tarif used for spp T7 prunus avium, sorbus etc.
T8		text	Code of Tarif used for spp T8 populus, alnus etc.
COMP_NAME		text	Name of Forest Compartment
SKID_METH		text	Type of skidding method (5 classes)
SKID_DIST		m	Distance of skidding
ACCESS_PC		%	Accessible area
FIRE_RISK		text	Fire risk (4 classes)
X		m UTM	Lat
Y		m UTM	Long
SFS_KE		text	SFS (Kraievna Enota) Local Unit (92 units)
METADATA		text	Record metadata
GZD1		text	Detailed forest plant association 1 (approx. 1845 classes)
ASOC1		text	First Forest plant association (approx. 100 classes)
ASOC1AR	977,393	ha	Area of first Forest plant association (ha)
ASOC2		text	Second Forest plant association (approx. 100 classes)
ASOC2AR	173,079	ha	Area of second Forest plant association (ha)
ASOC3		text	Third Forest plant association (approx. 100 classes)
ASOC3AR	32,244	ha	Area of third Forest plant association (ha)
OW2	867,645	ha	Area of forest ownership 2: PRIVATE
OW3	9,771	ha	Area of forest ownership 3: Other Officials (mainly religious institutions)
OW5	279,851	ha	Area of forest ownership 5: STATE
OW6	28,777	ha	Area of forest ownership 6: CIVIL (rural) COMMUNITIES
PH1AR	49,895	ha	Area under Phase Development 1: SEEDLINGS
PH2AR	317,972	ha	Area under Phase Development 2: POLE STAGE
PH3AR	481,966	ha	Area under Phase Development 3: TIMBER STAND

PH4AR	111,707	ha	Area under Phase Development 4: REGENERATION FOREST	
PH5AR	2,990	ha	Area under Phase Development 5: TWO LAYERS FOREST	
PH6AR	32,024	ha	Area under Phase Development 6: SMALL SCALE UNEVEN-AGE FOREST	
PH7AR	91,031	ha	Area under Phase Development 7: LARGE SCALE UNEVEN-AGE FOREST	
PH8AR	41,600	ha	Area under Phase Development 8: COPPICE	
PH9AR	20,676	ha	Area under Phase Development 9: BUSH FOREST	
PH10AR	25,054	ha	Area under Phase Development 10: PIONEER FOREST WITH BUSHES	
PH11AR	11,127	ha	Area under Phase Development 11: SELECTION FOREST	
YEAR_1		text	Starting year of current management plan	
For_area	1,186,043	ha	Area of forest within compartment	
EXPLAREA	1,084,591	ha	Exlpoitable forest area (Forest categories 1 and 2 only). All other forest variables relate to this area.	
TOTAREA	1,996,154	ha	Tot Compartment area (in some regions the area includes only forests!!)	
CUT_WOOD	3,374,070	m3	Annual actual cut (m3) of all timber and non-timber assortments for EXPLAREA	
CU2_WOOD	4,079,916		Estimation of actual cut based on application of coefficients (Cut coef 2011.mdb) to CUT_WOOD . Values appear too high	
CUT_WOOD_t	1,937,886	t (od)	Annual actual cut of all timber and non-timber assortments for EXPLAREA including branches 3-7cm	(([GWS_con]/([GWS_con]+[GWS_bro]))*[cut_wood]*0.4+ ([GWS_bro]/([GWS_con]+[GWS_bro]))*[cut_wood]*0.584)*1.15
CU2_WOOD_t	2,348,917		Estimation of actual cut based on application of coefficients (Cut coef 2011.mdb) to CUT_WOOD_t . Values appear too high	
PREF_FW	1,795,777	m3	Annual allow. cut (m3) of non-timber assortments of fuelwood species commonly used (group BCD) for EXPLAREA	
PREF_FW_t	1,206,044	t (od)	Annual allow. cut of non-timber assortments of fuelwood species commonly used (group BCD) for EXPLAREA including branches 3-7cm	[pref_fw]*0,584*1,15
CUT_P_FW	1,198,474	m3	Annual actual cut (m3) of non-timber assortments of fuelwood species commonly used (group BCD) for EXPLAREA	
CU2_P_FW	1,474,419		Rev. Annual actual cut (m3) of non-timber assortments of fuelwood species commonly used (group BCD) for EXPLAREA	
CUT_P_FW_t	804,895	t (od)	Annual actual cut of non-timber assortments of fuelwood species commonly used (group BCD) for EXPLAREA including branches 3-7cm	[cut_p_fw]*0,584*1,15
CU2_P_FW_t	990,220		Rev. Annual actual cut of non-timber assortments of fuelwood species commonly used (group BCD) for EXPLAREA including branches 3-7cm	
TOT_FW	2,603,790	m3	Annual allowable cut (m3) of non-timber assortments of all species (all conifers included) for EXPLAREA	
TOT_FW_t	1,588,518	t (od)	Annual allowable cut of non-timber assortments of all species (all conifers	(([conif]+[larix])*0.4+([TOT_fw]-[conif]-[larix])*0.584)*1.15

			included) for EXPLAREA including branches 3-7cm	
CUT_FW	1,721,050	m3	Annual actual cut (m3) of non-timber assortments of all species (all conifers included) for EXPLAREA	
CU2_FW	2,121,411		Rev. Annual actual cut (m3) of non-timber assortments of all species (all conifers included) for EXPLAREA	
CUT_FW_t	1,052,556	t (od)	Annual actual cut of non-timber assortments of all species (all conifers included) for EXPLAREA including branches 3-7cm	(([cut_con]+[cut_lar])*0.4+([cut_fw]-[cut_con]-[cut_lar])*0.584)*1.15
CU2_FW_t	1,297,657		Rev. Annual actual cut of non-timber assortments of all species (all conifers included) for EXPLAREA including branches 3-7cm	
CONIF	741,585	m3	Annual allowable cut (m3) of non-timber assortments of Coniferous species (Larix excluded) for EXPLAREA	
CONIF_t	341,129	t (od)	Annual allowable cut of non-timber assortments of Coniferous species (Larix excluded) for EXPLAREA including branches 3-7cm	[conif]*0,4*1,15
CUT_CON	478,230	m3	Annual actual cut (m3) of non-timber assortments of Coniferous species (Larix excluded) for EXPLAREA	
CU2_CON	588,681		Rev. Annual actual cut (m3) of non-timber assortments of Coniferous species (Larix excluded) for EXPLAREA	
CUT_CON_t	219,986	t (od)	Annual actual cut of non-timber assortments of Coniferous species (Larix excluded) for EXPLAREA including branches 3-7cm	[cut_con]*0,4*1,15
CU2_CON_t	270,793		Rev. Annual actual cut of non-timber assortments of Coniferous species (Larix excluded) for EXPLAREA including branches 3-7cm	
LARIX	15,443	m3	Annual allowable cut (m3) of non-timber assortments of larix decidua for EXPLAREA	
LARIX_t	7,104	t (od)	Annual allowable cut of non-timber assortments of larix decidua for EXPLAREA including branches 3-7cm	[larix]*0,4*1,15
CUT_LAR	9,961	m3	Annual actual cut (m3) of non-timber assortments of larix decidua for EXPLAREA	
CU2_LAR	11,895		Rev. Annual actual cut (m3) of non-timber assortments of larix decidua for EXPLAREA	
CUT_LAR_t	4,582	t (od)	Annual actual cut of non-timber assortments of larix decidua for EXPLAREA including branches 3-7cm	[cut_lar]*0,4*1,15
CU2_LAR_t	5,472		Rev. Annual actual cut of non-timber assortments of larix decidua for EXPLAREA including branches 3-7cm	
HARDBRO	1,471,911	m3	Annual allowable cut (m3) of non-timber assortments of quality hard Broadleaved species for EXPLAREA	
HARDBRO_t	988,536	t (od)	Annual allowable cut of non-timber assortments of quality hard Broadleaved species for EXPLAREA including branches 3-7cm	[hardbro]*0,584*1,15
CUT_HBRO	982,614	m3	Annual actual cut (m3) of non-timber assortments of quality hard Broadleaved species for EXPLAREA	

CU2_HBRO	1,197,605		Rev. Annual actual cut (m3) of non-timber assortments of quality hard Broadleaved species for EXPLAREA	
CUT_HBRO_t	659,924	t (od)	Annual actual cut of non-timber assortments of quality hard Broadleaved species for EXPLAREA including branches 3-7cm	[cut_H_bro]*0,584*1,15
CU2_HBRO_t	804,312		Rev. Annual actual cut of non-timber assortments of quality hard Broadleaved species for EXPLAREA including branches 3-7cm	
FWSPP	308,422	m3	Annual allowable cut (m3) of Fuelwood assortments (selected hard Broadleaved species) for EXPLAREA	
FWSPP_t	207,136	t (od)	Annual allowable cut of Fuelwood assortments (selected hard Broadleaved species) for EXPLAREA including branches 3-7cm	[fwspp]*0,584*1,15
CUT_FWSPP	205,902	m3	Annual actual cut (m3) of Fuelwood assortments (selected hard Broadleaved species) for EXPLAREA	
CU2_FWSPP	264,923		Rev. Annual actual cut (m3) of Fuelwood assortments (selected hard Broadleaved species) for EXPLAREA	
CUT_FWSPPt	138,284	t (od)	Annual actual cut of Fuelwood assortments (selected hard Broadleaved species) for EXPLAREA including branches 3-7cm	[cut_fwspp]*0,584*1,15
CU2_FWSPPt	177,922		Rev. Annual actual cut of Fuelwood assortments (selected hard Broadleaved species) for EXPLAREA including branches 3-7cm	
SOFTBRO	66,428	m3	Annual allowable cut (m3) of non-timber assortments of soft Broadleaved species for EXPLAREA	
SOFTBRO_t	44,613	t (od)	Annual allowable cut of non-timber assortments of soft Broadleaved species for EXPLAREA including branches 3-7cm	[softbro]*0,584*1,15
CUT_S_BRO	44,348	m3	Annual actual cut (m3) of non-timber assortments of soft Broadleaved species for EXPLAREA	
CU2_S_BRO	58,314		Rev. Annual actual cut (m3) of non-timber assortments of soft Broadleaved species for EXPLAREA	
CUT_S_BROt	29,784	t (od)	Annual actual cut of non-timber assortments of soft Broadleaved species for EXPLAREA including branches 3-7cm	[CUT_S_BRO]*0,584*1,15
CU2_S_BROt	39,164		Rev. Annual actual cut of non-timber assortments of soft Broadleaved species for EXPLAREA including branches 3-7cm	
GWS_1	112,336,604	m3	Growing stock of stem vol of trees dbh>10 and <30cm for EXPLAREA	
GWS_2	151,655,255	m3	Growing stock of stem vol of trees dbh30-50cm for EXPLAREA	
GWS_3	63,458,334	m3	Growing stock of stem vol of trees dbh>50cm for EXPLAREA	
GWS_TOT	327,450,193	m3	Growing stock of stem volume of trees >10 cm dbh and min top D 7 cm for EXPLAREA	
GWS_CON	152,283,882	m3	Tot Growing stock of conifers (above 7 cm diam.) for ALL For. categories	
GWS_BRO	175,174,726	m3	Tot Growing stock of broadleaves (above 7 cm diam.) for ALL For. categories	

GWS_TO_7	59,595,332	m3	Tot Growing stock below 7 cm	
GWS_ROOT	80,019,971	m3	Tot Growing stock of root system	
INCR_1	3,876,060	m3	Increment of stem vol of trees dbh<30cm for EXPLAREA	
INCR_2	3,196,795	m3	Increment of stem vol of trees dbh30-50cm for EXPLAREA	
INCR_3	915,969	m3	Increment of stem vol of trees dbh>50cm for EXPLAREA	
INCRST_TOT	7,988,824	m3	Increment of stem vol for EXPLAREA	
INCR_TOT	11,402,906	m4	Tot annual Increment (above & below ground, above 3 cm diam.) for ALL For. Categories (INCR_CON+ INCR_BRO+ INCRTO_7+ INCR_ROOT)	
INCR_CON	3,531,074	m3	Tot annual Increment of conifers (above 7 cm diam.) for ALL For. categories	
INCR_BRO	4,455,659	m3	Tot annual Increment of broadleaves (above 7 cm diam.) for ALL For. categories	
INCRTO_7	1,453,585	m3	Tot annual Increment below 7 cm	([Incr_con]+[Incr_bro])*0,182
INCR_ROOT	1,962,587	m3	Tot annual Increment of root system	([Incr_con]*0,182+[Incr_con])*0,18+([Incr_bro]*0,182+ [Incr_bro])*0,23
A_CUT_CON	2,440,908	m3	Annual allowable cut of conifers (above 7 cm diam.) for ALL For. categories	
A_CUT_BRO	2,685,513	m3	Annual allowable cut of broadleaves (above 7 cm diam.) for ALL For. categories	
A_CUT_TOT	5,128,742	m3	Annual allowable cut (above 7 cm diam.) for ALL For. categories	
GWS_CON_T	60,913,553	t (od)	Tot Growing stock of conifers (above 7 cm diam.) for ALL For. categories	[GwS_con]*0,4
GWS_BRO_T	102,302,040	t (od)	Tot Growing stock of broadleaves (above 7 cm diam.) for ALL For. categories	[GwS_bro]*0,584
GWSTO_7_t	29,705,238	t (od)	Tot Growing stock below 7 cm	([GwS_con_t]+[GwS_bro_t])*0,182
GWS_ROOT_T	40,771,800	t (od)	Tot Growing stock of root system	([GwS_con_t]*0,182+[GwS_con_t])*0,18+([GwS_bro_t]*0,182+ [GwS_bro_t])*0,23
INCR_CON_T	1,412,430	t (od)	Tot annual Increment of conifers (above 7 cm diam.) for ALL For. categories	[Incr_con]*0,4
INCR_BRO_T	2,602,105	t (od)	Tot annual Increment of broadleaves (above 7 cm diam.) for ALL For. categories	[Incr_bro]*0,584
INCRTO_7_t	730,645	t (od)	Tot annual Increment below 7 cm	([Incr_con_t]+[Incr_bro_t])*0,182
INCROOT_t	1,007,917	t (od)	Tot annual Increment of root system	([Incr_con_t]*0,182+[Incr_con_t])*0,18+([Incr_bro_t]*0,182+ [Incr_bro_t])*0,23
ACUT_CON_t	976,363	t (od)	Annual allowable cut of conifers (above 7 cm diam.) for ALL For. categories	[A_cut_con]*0,4
ACUT_BRO_t	1,568,339	t (od)	Annual allowable cut of broadleaves (above 7 cm diam.) for ALL For. categories	[A_cut_bro]*0,584
ACUT_TOT_t	2,544,703	t (od)	Annual allowable cut (above 7 cm diam.) for ALL For. categories	[ACUT_CON_t] + [ACUT_BRO_t]
GWSLEAF_C	4,679,988	t (od)	Growing stock of leaves of conifers	([GWS_CON_t] * 0,182 + [GWS_CON_t])* 0,065
GWSLEAF_B	7,859,866	t (od)	Growing stock of leaves of broadleaves	([GWS_BRO_t] * 0,182 + [GWS_BRO_t])* 0,065
INCRLEAF_C	1,559,996	t (od)	Annual increment of leaves of conifers	[GWSLEAF_C] / 3

INCRLEAF_B	7,859,866	t (od)	Annual increment of leaves of broadleves	[GWSLEAF_B]
DEND_TOT_t	192,920,831	t (od)	Total dendromass (above ground woody biomass)	[GWS_CON_t] + [GWS_BRO_t] + [GWSTO_7_t]
BIO_TOT_t	246,232,485	t (od)	Total biomass (above and below ground)	[DEND_TOT_t] + [GWS_ROOT_t] + [GWSLEAF_C] + [GWSLEAF_B]
FOR_PIX	19,372,581	n	Number of 25m pixels in forest class (LU 2000)	
MAI_DM_t	4,745,180	t (od)	Mean Annual Increment of dendromass	= INCR_CON_T + INCR_BRO_T + INCRTO_7_T
INCR_CON_LQ	1,255,714	m3	Tot annual Increment (m3) of non-timber assortments of conifers (above 7 cm diam.) for ALL For. categories	
INCR_BRO_LQ	3,322,923	m3	Tot annual Increment (m3) of non-timber assortments of broadleaves (above 7 cm diam.) for ALL For. categories	
MAICON_DE_t	577,628	t (od)	Mean Annual Increment of dendroenergy (non-timber) woody biomass of broadleaves species	
MAIBRO_DE_t	2,231,675	t (od)	Mean Annual Increment of dendroenergy (non-timber) woody biomass of coniferous species	
MAI_DE_t	2,809,304	t (od)	Mean Annual Increment of dendroenergy (non-timber) woody biomass	= MAICON_DE_t + MAIBRO_DE_t
ACUT_DM_t	2,926,408	t (od)	Annual allowable cut of dendromass from all For. Categories	= ACUT_TOT_t * 1.15
ACUT_DE_t	1,588,518	t (od)	Annual allowable cut of dendroenergy mass from all For. Categories	= TOT_FW_t
avg_tree	68,654	m3	Average tree size (m^3/tree)based on Phase Development proportions (used to assess felling and skidding costs)	
SPFIR	569,406	m3	Annual allowable cut (m3) of non-timber assortments of spruce and fir	
SPFIR_t	261,927	t (od)	Annual allowable cut of non-timber assortments of spruce and fir including branches 3-7cm	[SPFIR]*0,4*1,15
CUT_SPFIR	366,637	m3	Annual actual cut (m3) of non-timber assortments of spruce and fir	
CU2_SPFIR	433,944	m3	Rev. Annual actual cut (m3) of non-timber assortments of spruce and fir	
CUT_SPFIR_t	168,653	t (od)	Annual actual cut of non-timber assortments of spruce and fir including branches 3-7cm	[CUT_SPFIR]*0,4*1,15
CU2_SPFIR_t	199,614	t (od)	Rev. Annual actual cut of non-timber assortments of spruce and fir including branches 3-7cm	
FIBER_t	1,250,066	t (od)	Allowable cut of non-timber assortment suitable for fiber feedstock (HARDBRO_t + SPFIR_t) including branches 3-7cm	[HARDBRO_t]+[SPFIR_t]
CUT_FIBER_t	882,236	t (od)	Annual actual cut of non-timber assortment suitable for fiber feedstock (CUT_HBRO_t + CUT_SPFIR_t) including branches 3-7cm	[CUT_HBRO_t]+[CUT_SPFIR_t]
CU2_FIBER_t	1,067,410	t (od)	Rev. Annual actual cut of non-timber assortment suitable for fiber feedstock (CUT_HBRO_t + CUT_SPFIR_t) including branches 3-7cm	

Annex 7. Non-forest biomass sources

A7.1 Non-forest woody biomass resources

			Dendromass		Biomass		
			Stock	MAI	stock	MAI	
CodeD	Name_ENG	AREA_ha	t/ha dry matter	t/ha dry matter	t/ha dry matter	t/ha dry matter	Remarks
1100	Fields	182,523	1.80	0.06	2.33	0.08	
1160	Hops fields	2,049	1.80	0.06	2.33	0.08	as 1100
1180	Fields with permanent plants (nurseries, asparagus, etc.)	310	1.80	0.06	2.33	0.08	as 1100
1190	Greenhouse	110	0.00	0.00	0.00	0.00	
1211	Vineyard	22,315	2.00	1.20	2.59	1.55	tentative
1212	Vine fields for grape nurseries	44	2.00	1.20	2.59	1.55	tentative
1221	Intensive orchard	4,606	19.86	0.67	25.72	0.87	
1222	Extensive orchard or meadow orchard	21,445	19.26	0.68	24.94	0.89	
1230	Olive trees orchard	1,781	19.86	0.83	25.72	1.07	Stock: as1220; MAI:Ref. Italy
1240	Other agricultural plantations	335	19.86	0.67	25.72	0.87	as1221
1300	Permanent meadow	371,588	8.67	0.29	11.23	0.38	weight of old 1310,1322
1321	Swamp meadow	6,411	5.10	0.17	6.60	0.22	as old 1310
1410	Re-growth on old farmland	20,743	34.44	1.30	44.60	1.68	
1420	Forest plantation	323	180.00	4.00	233.10	5.18	ref average forestry data
1500	"Belts of trees and bushes"	17,981	56.76	1.98	73.50	2.56	
1600	Agricultural area under preparation	2,748	1.80	0.06	2.33	0.08	as 1100
1800	Grass meadows (over 80 % of area) with forest trees	9,488	11.70	0.40	15.15	0.52	as old 1322
2000	Forest	1,213,945	-	-	-	-	replaced by comp data
3000	Urban and built up areas, roads	107,178	9.36	0.31	12.12	0.40	
4100	Swamp	65	1.20	0.06	1.55	0.08	tentative
4210	Reeds	82	2.40	0.12	3.11	0.16	tentative
4220	Other water logged areas	1,310	1.80	0.09	2.33	0.12	tentative
5000	Dry areas with special vegetation cover	16,481	24.00	0.90	31.08	1.17	tentative
6000	Barren land without grasses	12,411	0.00	0.00	0.00	0.00	
7000	Water bodies	13,910	0.00	0.00	0.00	0.00	

[TO BE REPLACE BY VALUES ACTUALLY USED (Rok)]

A7.2 Crop residues production in Emilia Romagna (Italy)

These values are presented as indicative indirect reference. The values relative to actual Slovenia crops should be replaced by direct local values.

	Prod residui t / ha (fresh)	Moisture %	Prod residui t / ha (dry matter)
Wheat (soft)	4,5	17	3,74
Wheat (hard)	4	17	3,32
Rye	4,25	17	3,53
Barley	4,25	17	3,53
Oats	4,25	17	3,53
Other cereals	4,25	17	3,53
Rice	4	25	3
Maiz	7,25	45	3,99
Sorghum	7,25	45	3,99
Sunflower	7,25	45	3,99
soy	0	0	0
Apples	2,5	40	1,5
Pears	2,5	40	1,5
Peach	2,5	40	1,5
Apricot	2,5	40	1,5
Cherry	2,5	40	1,5
Plum	2,5	40	1,5
Nectarine	2,5	40	1,5
Walnut	2,5	40	1,5
Diospiros khaki	2,5	40	1,5
Actinidia	2,5	40	1,5
Table grape	3,5	50	1,75
Wine grape	3,5	50	1,75
Olive	1,75	52,5	0,83

Annex 8. Household consumption estimates (WISDOM 2003)

Energy requirements for house heating only						
	Construction year	Requirements by type[1] kWh/m2	# of dwellings	Group average kWh/m2	Group average kWh/m2	Total average kWh/m2
single family houses	before 1980	185	13203			
		144	1467			
		163	6449	175.8		
		111	0			
		210	1317		**169.3**	
		151	1518			
	after 1980	111	375			
		111	1820			143.4
		90	337			
apartments in blocks	before 1980	125	11720			
		98	1302			
		90	4565		109.7	
		84	2533			
		75	281			

[1] Depending on levels of insulation and maintenance.

Ref: Estimation of potential emission reduction in Slovenia. Final report. Ministry of Environment. 2002

Estimated additional requirements for cooking and water heating	**30%** of house heating

Ref: Ministry of Energy. Study for energy plan and 2030 projection.

Fraction of Occupied dwellings primarily using wood	**0.814**
Fraction of 'large dwellings' area (> 80 m2) among primary wood users	**0.59**

Ref: [13] Census 2002 (file:Gozd_institut_t4_OB.xls)

Non-heated fraction of large dwellings	**0.3**

Reporting Consultant's estimate

Dwellings using wood (primarily) – Census 2002	
Total m^2	**17,335,126**
Estimated occupied and heated	
# 0f dwellings	**234,898**
Occupied dwellings	**191,312**
people in dw	**594,934**

Main conversion factors

1 kWh =	3600000	joules	=	3.6	MJ	
1 MJ =	0.277778	kWh				
1 CUM wood =	2900	kWh	=	10440	MJ	0.00 assumed efficiency loss
1 CUM wood =	0.725	tons	(average for *fagus* 20%humidity in Germany- average FAO)			
1 CUM wood =	1.54	m3 stack wood				
1 kg wood =	3.366	kWh				
1 kg wood =	14.4	MJ	=	4.0000032	kWh	

Energy requirements [1]			**0.85** efficiency			**0.65** efficiency		
			2465 =kWh/CUM			1885 =kWh/CUM		
	kWh/m^2	**MJ/m^2**	**CUM/m^2**	**tons/m^2**	**Stackwood/m^2**	**CUM/m^2**	**tons/m^2**	**Stackwood/m^2**
house heating	160	576	0.0649	0.0471	0.0999	0.08488	0.0615	0.1306
total heat. & cooking	208	748.8	0.0844	0.0612	0.1298	0.11034	0.0800	0.1698
Total Slovenia	**kWh**	**TJ**	**CUM**	**tons**	**m3 stackwood**	**CUM**	**tons**	**m3 stackwood**
house heating	1,858,926,454	6,692	754,128	546,743	1,160,197	986,167	714,971	1,517,180
total heat. & cooking	**2,416,604,390** #	8,700	980,366	710,765	1,508,256	1,282,017	929,462	1,972,334
by dwelling (wf users)	**kWh/dw**	**MJ/dw**	**CUM/dw**	**tons/dw**	**Stackwood/dw**	**CUM/dw**	**tons/dw**	**Stackwood/dw**
house heating	9,717	34,980	3.9	2.86	6.1	5.2	3.74	7.9
total heat. & cooking	12,632	45,474	5.1	3.72	7.9	6.7	4.86	10.3
by inhabitant (wf users)	**kWh/inh**	**MJ/inh**	**CUM/inh**	**tons/inh**	**Stackwood/inh**	**CUM/inh**	**tons/inh**	**Stackwood/inh**
house heating	3,125	11,249	1.3	0.92	2.0	1.7	1.20	2.6
total heat. & cooking	4,062	14,623	1.6	1.19	2.5	2.2	1.56	3.3

= value used as 2002 national reference for the estimation/projection of the total 2009 consumption, based on population growth rates

Annex 9: Names and description of main maps

Raster maps are at 25 m resolution, unless otherwise specified.

Module/filename	Type	Description
Cartographic base		
RABA_20100125.shp	v	
lu_2010	r	grid with LU codes
Comp2009	r	grid with compartment codes (field com_code in comp2009.shp in gdb comp09_d.mdb)
for_reg_ggo	r	Forest regions (14) based on ??
for_ggo_c9	r	Forest regions (14) based on Comp2009
Slo_msk0	r	Mask (value=0) of the maximum common area covered by supply and demand layers
Slo_msk1	r	Mask (value=1) of the maximum common area covered by supply and demand layers
Accessibility maps		
slope_2	r	slope map
slope1	r	Original slope map +1 to avoid 0 values in CD calculations
cd_2		
cd_2clip		Int([cd_2] + 0.5) * [slo_msk1]
cd_40		reclass cd_2clip classified Nat Breaks 40 classes
acc_18		accessibility map based on cd_40 with values from 100 to 18% = reclass(cd_40, recl_cd40_acc_18.txt)
Supply Module		
SLO_ODS_2009.shp		Vector map of forest compartments 2009 with attributes shown in Annex 5
		attribute description in file SLO_ODS_CODE3b.xls reclassification values are in file comp2009c_recl.xls
comp09c.mdb	g	geodatabase of forest compartments
comp2009	s	shapefile in geodatabase comp2009c.mdb
c9BIOTOT_KG	r	biomass (woody and leaves, above and below ground) in woody vegetation in forest compartments (od kg/pixel) = reclass(comp2009, recl_c9_biotot_kgpix.txt)
c9DM_KG	r	stock of dendromass (above ground woody biomass) in forest compartments (od kg/pixel) = reclass(comp2009, recl_c9_dendromass_kgpix.txt)
c9mai_dm		MAI of dendromass (above ground woody biomass) in forest compartments (od kg/pixel) (field: mai_dm_t) = reclass(comp2009, recl_c9_mai_dm_kgpix.txt)
c9mai_de		MAI of dendroenergy mass (above ground woody biomass) in forest compartments (od kg/pixel) (field: mai_dm_t) = reclass(comp2009, recl_c9_mai_de_kgpix.txt)
c9acut_dm		Allowable cut of dendromass (above ground woody biomass) in forest compartments (od kg/pixel) (field: ACUT_DM_t) = reclass(comp2009, recl_c9_acut_dm_kgpix.txt)
c9acut_de		Allowable cut of dendroenergy mass (above ground woody biomass of non-timber assortments) in forest compartments (od kg/pixel) (field:ACUT_DE_t = reclass(comp2009, recl_c9_acut_de_kgpix.txt)
		Actually cut assortments **(from records)**
c9_cut_dm	r	Recorded actual cut of dendromass (above ground woody biomass) in forest compartments (od kg/pixel) (field: CUT_WOOD_t) = reclass(comp2009, recl_c9_cut_dm_kgpix.txt)
c9_cut_de	r	Recorded actual cut of non-timber woody biomass (above ground) in forest compartments (od kg/pixel) (field: CUT_FW_t = reclass(comp2009, recl_c9_cut_de_kgpix.txt)
		Actually cut assortments **(estimated)**
c9_cu2_dm	r	Estimated Actual cut of dendromass (above ground woody biomass) in forest compartments (od kg/pixel) (field: CUT_WOOD_t)

		= reclass(comp2009, recl_c9_cu2_dm_kgpix.txt)
c9_cu2_de	r	Estimated Actual cut of dendroenergy mass (above ground woody biomass) in forest compartments (od kg/pixel) (field: CUT_FW_t = reclass(comp2009, recl_c9_cu2_de_kgpix.txt)
c9_acutfiber	r	Allowable cut of dendroenergy mass (above ground woody biomass of non-timber assortments) suitable for fiber industries in forest compartments (od kg/pixel) (field: FIBER_t) = reclass(comp2009, recl_c9_acut_fiber_kgpix.txt)
c9_cutfiber	r	Actual cut of dendroenergy mass (above ground woody biomass of non-timber assortments) suitable for fiber industries in forest compartments (od kg/pixel) (field: CUT_FIBER_t) = reclass(comp2009, recl_c9_cut_fiber_kgpix.txt)
c9_cu2fiber	r	Estimated Actual cut of dendroenergy mass (above ground woody biomass of non-timber assortments) suitable for fiber industries in forest compartments (od kg/pixel) (field: CUT_FIBER_t) = reclass(comp2009, recl_c9_cu2_fiber_kgpix.txt)
		Supply potential from non-forest land use classes reclassification values are in file Land use classes 2010 & biom values.xls
lu_biostk	r	stock of biomass (woody and leaves, above and below ground) in woody veg. (od kg/pixel) in non-forest land uses = reclass(lu_2010, recl_lu_biom_stk_kgpix.txt)
lu_biomai	r	MAI of biomass (woody and leaves, above and below ground) in woody veg. (od kg/pixel) in non-forest land uses = reclass(lu_2010, recl_lu_biom_mai_kgpix.txt)
lu_dmstk	r	stock of dendromass (above ground woody biomass) in non-forest land uses (od kg/pixel) = reclass(lu_2010, recl_lu_dm_stk_kgpix.txt)
lu_dmmai	r	MAI of dendromass (above ground woody biomass) in non-forest land uses (od kg/pixel) = reclass(lu_2010, recl_lu_dm_mai_kgpix.txt)
biomass_stk	r	Stock of biomass (woody and leaves, above and below ground) in woody vegetation from forests and other LU classes (od kg/pixel) = merge(c9biotot_kg, lu_biostk)
d_mass_stk	r	Stock of dendromass from forests and other LU classes (above ground woody biomass) (od kg/pixel) = merge(c9dm_kg, lu_dmstk)
d_mass_mai		MAI of dendromass from forests and other LU classes (above ground woody biomass) (od kg/pixel) = merge(c9mai_dm, lu_dmmai)
d_e_mai		MAI of dendroenergy mass (non-timber woody biomass) from forests and other LU classes (above ground woody biomass) (od kg/pixel) = merge(c9mai_de, lu_dmmai)
d_mass_acut		Allowable cut of dendromass from forests and other LU classes (above ground woody biomass) (od kg/pixel) = merge(c9acut_dm, lu_dmmai)
d_e_acut		Allowable cut of dendroenergy mass from forests and other LU classes (above ground woody biomass of non-timber assortments) (od kg/pixel) = merge(c9acut_de, lu_dmmai)
		Actual cut (from records and estimated)
d_mass_cut		Recorded actual cut of dendromass from forests and other LU classes (above ground woody biomass) (od kg/pixel) = merge(c9_cut_dm, lu_dmmai)
d_mass_cu2		Estimated actual cut of dendromass from forests and other LU classes (above ground woody biomass) (od kg/pixel) = merge(c9_cu2_dm, lu_dmmai)
d_e_cut		Recorded actual cut of dendroenergy mass (non-timber woody biomass) from forests and other LU classes (above ground woody biomass of non-timber assortments) (od kg/pixel) = merge(c9_cut_de, lu_dmmai)
d_e_cu2		Estimated actual cut of dendroenergy mass (non-timber woody biomass) from forests and other LU classes (above ground woody biomass of non-timber assortments) (od kg/pixel) = merge(c9_cu2_de, lu_dmmai)
		Analysis of economic accessibility component
dist4cat		Distant component with 4 categories: 20 (0-200m), 40 (200-400m), 60 (400-600m), 90 (> 600m)
slp_5cat		Slope component with 5 categories on: degrees intervals: 0-4; 4-10; 10-15; 15-25; > 25
dist_slp		Combined distance and slope codes
avg_tree		Average tree size according to phase development categories present within the compartment

coef_a2		Coefficient “a” relative to dist_slp categories
coef_b2		Coefficient “b” relative to dist_slp categories
cost_m3		Cost of felling and skidding of non-timber woody biomass to nearest road. = pow((coef_a2 * avg_tree), coef_b2)
cost_5zones		Cost categories:1 (<18€/m^3); 2 (18 – 22) ; 3 (22 – 26); 4 (26 – 30); 5 (> 30). Class 0 = outside forest compartments.
cost22msk		Areas with felling and skidding costs < 22 € reclass cost_5zones: 0, 1, 2 = 1; 3, 4, 5 = 0
cost26msk		Areas with felling and skidding costs < 26 € reclass cost_5zones: 0, 1, 2, 3 = 1; 4, 5 = 0
cost30msk		Areas with felling and skidding costs < 30 € reclass cost_5zones: 0, 1, 2, 3, 4 = 1; 5 = 0
		Indirect sources: sawmill residues
Sawmills2010_point_rev.shp	v	Reviewed sawmill point map in order to avoid more than one point per 25 m cell
r_res_con_t	r	Sawmills residues – coniferous wood (odt) (from field res_con_t map Sawmills2010_point_rev.shp (od t / pixel)
r_res _bro_t	r	Sawmills residues – broadleaves wood (odt) (from field res_bro_t map Sawmills2010_point_rev.shp (od t / pixel)
res_own_e_t	r	Residues used for own energy needs (from field own_en_t of map Sawmills2010_point_rev.shp (od t / pixel)
res_sell_e_t	r	Residues sold for energy use (from field sell_en_t of map Sawmills2010_point_rev.shp (od t / pixel)
res_sell_in_t	r	Residues sold for other industrial use (from field sell_ind_t of map Sawmills2010_point_rev.shp (od t / pixel)
res_no_use_t	r	Residues dumped or unused (from field dump_unuse of map Sawmills2010_point_rev.shp (od t / pixel)
rescon_kg		Sawmills residues – coniferous wood (od kg / pixel) (reviewed values) on 0 background values = merge(r_res_con_t * 1000, lu_msk0)
resbro_kg		Sawmills residues – broadleaves wood (od kg / pixel) (reviewed values) on 0 background values = merge(r_res_bro_t * 1000, lu_msk0)
res_kg		Woody biomass residues from wood processing industries (od kg / pixel) (reviewed values) on 0 background values = resbro_kg + rescon_kg
resown_en_kg		Residues used for own energy needs (od kg / pixel) on 0 background values = merge(res_own_e_t * 1000, lu_msk0) (Layer added to other consumption layers to create wood energy demand map)
ressell_en_kg		Residues sold for energy use (od kg / pixel) on 0 background values = merge(res_sell_e_t * 1000, lu_msk0)
ressell_in_kg		Residues sold for other industrial use (od kg / pixel) on 0 background values = merge(res_sell_in_t * 1000, lu_msk0)
resnouse_kg		Residues dumped or unused (od kg / pixel) on 0 background values = merge(res_no_use_t * 1000, lu_msk0)
		tot non-timber woody biomass from direct & indirect sources potentially available for energy and for other competing uses (fiber, particle, mech. pulp, tannin industries) = Allowable cut of dendroenergy mass (above ground woody biomass of non-timber assortments) (d_e_acut) + Woody biomass residues from wood processing industries (res_kg) Recovered woody biomass still missing !!
de_mai_res		Non-timber woody (dendroenergy) biomass potential (including full mai) from direct and indirect sources (sawmill residues) (od kg / pixel) = d_e_mai + res_kg
legac_de_res		Legally accessible non-timber woody (dendroenergy) biomass from direct and indirect sources (sawmill residues) (od kg / pixel) = d_e_acut + res_kg
cut_de_res		Recorded actual cut of non-timber woody (dendroenergy) biomass from direct and indirect sources (sawmill residues) (od kg / pixel) = d_e_cut + res_kg
cu2_de_res		Estimated actual cut of non-timber woody (dendroenergy) biomass from direct and indirect sources (sawmill residues) (od kg / pixel) = d_e_cu2 + res_kg
acutres_fib		Legally accessible “fiber” feedstock potential from direct and indirect sources including: Allowable cut of dendroenergy mass (above ground woody biomass of non-timber assortments) suitable for fiber industries in forest compartments plus industrial wood residues (od kg/pixel) = merge(c9_acutfiber, slo_msk0) + res_kg

cutres_fib		Current "fiber" feedstock potential from direct and indirect sources, including: Recorded Annual actual cut of dendroenergy mass (above ground woody biomass of non-timber assortments) suitable for fiber industries in forest compartments plus industrial wood residues (od kg/pixel) = merge(c9_cutfiber, slo_msk0) + res_kg
cu2res_fib		Current "fiber" feedstock potential from direct and indirect sources, including: Estimated Annual actual cut of dendroenergy mass (above ground woody biomass of non-timber assortments) suitable for fiber industries in forest compartments plus industrial wood residues (od kg/pixel) = merge(c9_cu2fiber, slo_msk0) + res_kg
		Crop residues (non woody) at crop site see values in Agrires_by_lu_ob.xls . The total available residues estimated by LU and by Obcina based on GERK data (ref: Njive in nasadi_RABA.DBF of 04 April 2011) were distributed according to LU classes (tot resid / # pixel of Lu and OB classes)
agri_resid.shp	v	vector map of agricultural residues production at crop site (dry matter) based on GERK data
agres_dmkg	r	Crop residues (non-woody) at crop site in kg per pixel (dry matter) = reclass(lu_2010_ob, recl_lu_2010_ob_agres_kg_px.txt)
Demand Module		
heat_m2_pix	r	M2 of heated surface associated to each building pixel in each KO = reclass(build_ko, recl_KO_heat_m2_pix.txt)
heat_days	r	Number of days requiring heating in Slovenia
hea_m2_days	r	M2 * number of days = [heat_m2_pix] * [heat_days]
hh_conskg	r	Household consumption (od kg /pixel) = hea_m2_days * 0.257939233 (od kg of wood – *fagus* WD 584 - to heat 1m^2 for 1 day)
hh_conskg0		Household consumption (NoData=0) (un-smoothed pixel values) (od kg /pixel) = merge(hh_conskg, slo_msk0)
hh_conskwh	r	Household consumption (kwh /pixel) = hea_m2_days * 0.833987207 (kWh needed to heat 1m^2 for 1 day)
hh_conskwh0		Household consumption (NoData=0) (un-smoothed pixel values) (kwh /pixel) = merge (hh_conskwh, slo_msk0)
hh_conskg_f20	r	HH consumption "smoothed" on surrounding 20 pixels (500 m)
hh_kg_f1km	r	HH consumption "smoothed" on surrounding 1 km
		Consumption by District Heating Systems (DHS) and by Combined Heat and Power plants (CHP). Details in file DHS_&_CHP_plants_from_SFI.xls
dhs_chp_rev.shp	p	Point map of DHS and CHP plants locations with attributes
dhs_chp_odkg	r	Consumption by District Heating Systems (DHS) and by Combined Heat and Power plants (CHP) allocated to individual pixels (oven-dry kg / year)
dhs_chp_kg0	r	Consumption by District Heating Systems (DHS) and by Combined Heat and Power plants (CHP) allocated to individual pixels (oven-dry kg / year) on 0 background values = merge(dhs_chp_odkg, slo_msk0)
we_cons_kg0	r	Summary consumption of woody biomass for energy (un-smoothed pixel values) = hh_conskg0 + dhs_chp_kg0 + resown_en_kg
we_conskgf30	r	consumption of woody biomass for energy "smoothed" on surrounding 20 + 10 pixels (750 m)
		NON-ENERGY Consumption of non-timber woody biomass (competing uses) **Fiber, Particle board, Mechanical pulp, Tannin**
PULP and fibreboards_point.shp	p	Point map of locations of Fiber, Particle board, Mechanical pulp, Tannin industries with consumption by assortments (DM_CON; DM_HBRO; DM_SBRO; DM_RESID; DM_TOT_T; DM_TOT_KG)
pulp_fib_odkg	r	Total consumption of woody biomass by fiber industries associated to individual pixels
pulp_fib_kg0	r	Total consumption of woody biomass by fiber industries associated to individual pixels with 0 background values = merge(pulp_fib_odkg, slo_msk0)
Integration Module		
bal_mai		Balance between the full non timber woody biomass resource potential (mai de + residues) and current consumption for energy and for fiber industries = de_mai_res - we_cons_kg0 - pulp_fib_kg0
bal_de		Balance between the legally accessible non timber woody biomass resource (allowable cut de + residues) and current consumption for energy and for fiber industries = legac_de_res - we_cons_kg0 - pulp_fib_kg0

bal_def20	Smoothed map (500 m) of balance between the legally accessible non timber woody biomass resource (allowable cut de + residues) and current consumption for energy and for fiber industries = focalmean bal_de; circle, 20, mean
bal_cut	Balance between the (minimum) currently available non timber woody biomass resource (recorded actual cut de + residues) and current consumption for energy and for fiber industries = cut_de_res - we_cons_kg0 - pulp_fib_kg0
bal_cu2	Balance between the (probable) currently available non timber woody biomass resource (estimated actual cut de + residues) and current consumption for energy and for fiber industries = cu2_de_res - we_cons_kg0 - pulp_fib_kg0
	Balance maps with various maximum felling_skidding cost thresholds
	Scenario 1 : Legally accessible resources (allowable cut)
bal_de22	Balance between the legally accessible non timber woody biomass resource (allowable cut de + residues) and current consumption for energy and for fiber industries EXCLUDING wood with felling&skidding cost > 22 € /m^3 = bal_de * cost22msk
balde22f20	Smoothed bal_de22 map (500 m) = focalmean bal_de22; circle, 20, mean
bal_de26	Balance between the legally accessible non timber woody biomass resource (allowable cut de + residues) and current consumption for energy and for fiber industries EXCLUDING wood with felling&skidding cost > 26 € /m^3 = bal_de * cost26msk
bal_de30	Balance between the legally accessible non timber woody biomass resource (allowable cut de + residues) and current consumption for energy and for fiber industries EXCLUDING wood with felling&skidding cost > 30 € /m^3 = bal_de * cost30msk
	Scenario 2 : Actual cut resources (estimated)
bal_cu2_22	Balance between the (probable) currently available non timber woody biomass resource (estimated actual cut de + residues) and current consumption for energy and for fiber industries EXCLUDING wood with felling&skidding cost > 22 € /m^3 = bal_cu2 * cost22msk
balcu2_22f20	Smoothed bal_cu2_22 map (500 m) = focalmean bal_cu2_22; circle, 20, mean
bal_cu2_26	Balance between the (probable) currently available non timber woody biomass resource (estimated actual cut de + residues) and current consumption for energy and for fiber industries EXCLUDING wood with felling&skidding cost > 26 € /m^3 = Bal_cu2 * cost26msk
bal_cu2_30	Balance between the (probable) currently available non timber woody biomass resource (estimated actual cut de + residues) and current consumption for energy and for fiber industries EXCLUDING wood with felling&skidding cost > 30 € /m^3 = Bal_cu2 * cost30msk
	Scenario 3 : Actual cut resources (recorded)
bal_cut_22	Balance between the (recorded) currently available non timber woody biomass resource (recorded actual cut de + residues) and current consumption for energy and for fiber industries EXCLUDING wood with felling&skidding cost > 22 € /m^3 = bal_cut * cost22msk
balcut_22f20	Smoothed bal_cut_22 map (500 m) = focalmean(bal_cut_22; circle, 20) * slo_msk1
bal_cut_26	Balance between the (recorded) currently available non timber woody biomass resource (recorded actual cut de + residues) and current consumption for energy and for fiber industries EXCLUDING wood with felling&skidding cost > 26 € /m^3 = Bal_cut * cost26msk
bal_cut_30	Balance between the (recorded) currently available non timber woody biomass resource (recorded actual cut de + residues) and current consumption for energy and for fiber industries EXCLUDING wood with felling&skidding cost > 30 € /m^3 = Bal_cut * cost30msk
	Balance for competing dendroenergy biomass
bal_acut_fib	

	= acutres_fib - pulp_fib_kg0 - resown_en_kg - ressell_en_kg
bal_cut_fib	= cutres_fib - pulp_fib_kg0 - resown_en_kg - ressell_en_kg
bal_cu2_fib	= cu2res_fib - pulp_fib_kg0 - resown_en_kg - ressell_en_kg
	Analysis of suitable locations for woody biomass plants
	Considering full allowable cut
bal_de500a	resampled balance map to 500m with average 25m cell value in odkg/25m pixel = resample(bal_def20; 500 m ; nearest; snap to bal_def20)
bal_de500_t	Balance map 500m (od t / 500m pixel) = bal_de500a * 400 /1000
bal_de30km	Balance totalizing the values of surrounding 30 km (no cost factors considered) = focalSUM(bal_de500_t, circle, 60) * slo_msk1
	Smoothing
bal_de30k	Balance averaging the values of surrounding 10 km = focalMEAN(bal_de30km, circle, 20) * slo_msk1
	Considering allowable cut with felling&skidding cost<= 22 €/m^3
bal22_500a	resampled balance map (with felling&skidding cost<=22€/m3) to 500m with average 25m cell value in odkg/25m pixel = resample(balde22f20; 500 m ; nearest; snap to bal_de500_t)
bal22_500t	Balance map 500m with felling&skidding cost<=22€/m^3 (od t / 500m pixel) = bal22_500a * 400 /1000
bal22_30km	Balance with felling&skidding cost<=22€/m^3 totalizing the values of surrounding 30 km = focalSUM(bal22_500t, circle, 60) * slo_msk1
	Smoothing
bal22_30k	Balance with felling&skidding cost<=22€/m^3 averaging the values of surrounding 10 km = focalMEAN(bal22_30km, circle, 20) * slo_msk1
	Considering estimated actual cut with felling&skidding <= 22 €/m^3
b_cu2_22_500a	resampled balance map (with felling&skidding cost<=22€/m^3) to 500m with average 25m cell value in odkg/25m pixel = resample(balcu2_22f20; 500 m ; nearest; snap to bal_de500_t)
b_cu2_22_500t	Balance map 500m with felling&skidding cost<=22€/m^3 (od t / 500m pixel) = b_cu2_22_500a * 400 /1000
b_cu2_22_30km	Balance with felling&skidding cost<=22€/m^3 totalizing the values of surrounding 30 km = focalSUM(b_cu2_22_500t, circle, 60) * slo_msk1
	Smoothing
b_cu2_22_30k	Balance with felling&skidding cost<=22€/m^3 averaging the values of surrounding 10 km = focalMEAN(b_cu2_22_30km, circle, 20) * slo_msk1
b_cu2_22_20km	Balance with felling&skidding cost<=22€/m^3 totalizing the values of surrounding 20 km = focalSUM(b_cu2_22_500t, circle, 40) * slo_msk1
b_cu2_22_20k	Balance with felling&skidding cost<=22€/m^3 averaging the values of surrounding 5 km = focalMEAN(b_cu2_22_30km, circle, 10) * slo_msk1
	Considering recorded actual cut with felling&skidding <= 22 €/m^3
b_cut_22_500a	resampled balance map (with felling&skidding cost<=22€/m^3) to 500m with average 25m cell value in odkg/25m pixel = resample(balcut_22f20; 500 m ; nearest; snap to bal_de500_t)
b_cut_22_30km	Balance with felling&skidding cost<=22€/m^3 totalizing the values of surrounding 30 km = focalSUM((b_cut_22_500a * 400 /1000), circle, 60) * slo_msk1
	Smoothing
b_cut_22_30k	Balance with felling&skidding cost<=22€/m^3 averaging the values of surrounding 10 km = focalMEAN(b_cut_22_30km, circle, 20) * slo_msk1
b_cu2_22_20km	Balance with felling&skidding cost<=22€/m^3 totalizing the values of surrounding 20 km = focalSUM(b_cu2_22_500t, circle, 40) * slo_msk1
b_cu2_22_20k	Balance with felling&skidding cost<=22€/m^3 averaging the values of surrounding 5 km = focalMEAN(b_cu2_22_30km, circle, 10) * slo_msk1

Woodshed analysis

		Test case on Idrija
Idrija_urban	v	Urban area of Idrija
cd_Idrjia	r	Cost-distance from Idrija_urban (cost = cd4_40)
cd_Idrjia246		Accessibility buffer zones of Idrjia based on reclass of cd_Idrjia on defined interval
		Test case on Ilirska Bistrica
Ilirska Bistrica	v	Wood industry
cd1_IB	r	Cost-distance from the wood industry of Ilirska Bistrica (cost = cd4_40) =
cd1_ib_274		Accessibility buffer zones of the wood industry of Ilirska Bistrica based on reclass of cd1_IB on defined interval

Annex 10: Factors and parameters used for the analysis of the economic accessibility of forest woody biomass

Coding	Distance from the nearest motorable road
20	to 200 m
40	200 to 400 m
60	400 to 600 m
90	600m+

	Slope categories
1	0 to 4 degree
2	4 to 10 degree
3	10 to 15 degree
4	15 to 25 degree
5	over 25 degree

	Phase development stages used in Kovac's study	Avg tree volume
1	Early pole	0.15
2	Late pole	0.50
3	Timber	1.80
4	Regeneration	2.00

Phase development stages considered in Stand and Compartment databases

PHase Development	DESCRIPTION	Avg cut tree volume (m^3)	Tot for_area (ha)
01	SEEDLINGS	0.075	49,908
02	POLE STAGE	0.35	317,986
03	TIMBER STAND	1.8	481,985
04	REGENERATION FOREST	2	111,712
05	TWO LAYERS FOREST	1.4	2,990
06	SMALL SCALE UNEVEN-AGE FOREST	1.4	32,024
07	LARGE SCALE UNEVEN-AGE FOREST	1.6	91,039
08	COPPICE	0.3	41,600
09	BUSH FOREST	0.1	20,676
10	PIONEER FOREST WITH BUSHES	0.15	25,055
11	SELECTION FOREST	1.2	11,127

Cost functions derived from Kovac's study used for the analysis of the economic accessibility of forest woody biomass.

Slope / development phase	Avg tree volume	Kovac's cost values (€/m³)				Coefficients (Cost = a * avg. Tree vol ^ b)							
slope . 0 to 4 degree		to 200 m	200 to 400 m	400 to 600 m	600m+	to 200 m		200 to 400 m		400 to 600 m		600m+	
						a	b	a	b	a	b	a	b
Early pole stage	0.15	29.27	30.52	31.78	33.03								
Late pole stage	0.50	17.80	19.05	20.30	21.56	**15.4800**	**-0.3141**	**16.7770**	**-0.2941**	**18.0680**	**-0.2670**	**19.3560**	**-0.2613**
Timber tree	1.80	13.10	14.36	15.61	16.86								
Regeneratiom forest	2.00	12.69	13.95	15.20	16.46								
slope: 4 to 10 degree													
Early pole stage	0.15	29.77	31.09	32.42	33.74								
Late pole stage	0.50	18.08	19.41	20.73	22.05	**15.7440**	**-0.3139**	**17.1130**	**-0.2932**	**18.4750**	**-0.2753**	**19.8340**	**-0.2595**
Timber tree	1.80	13.32	14.65	15.97	17.29								
Regeneratiom forest	2.00	12.92	14.24	15.57	16.89								
slope: 10 to 15 degree													
Early pole stage	0.15	30.27	31.66	33.06	34.45								
Late pole stage	0.50	18.37	19.77	21.16	22.55	**16.0070**	**-0.3137**	**17.4490**	**-0.2924**	**18.8820**	**-0.2740**	**20.3120**	**-0.2578**
Timber tree	1.80	13.55	14.94	16.33	17.72								
Regeneratiom forest	2.00	13.15	14.54	15.94	17.33								
slope: 15 to 25 degree													
Early pole stage	0.15	30.77	32.23	33.69	35.16								
Late pole stage	0.50	18.66	20.12	21.58	23.04	**16.2710**	**-0.3135**	**17.7840**	**-0.2916**	**19.2890**	**-0.2727**	**20.7900**	**-0.2562**
Timber tree	1.80	13.77	15.23	16.69	18.15								
Regeneratiom forest	2.00	13.37	14.84	16.30	17.77								
slope: over 25 degree													
Early pole stage	0.15	31.27	32.80	34.33	35.86								
Late pole stage	0.50	18.94	20.48	22.01	23.54	**16.5350**	**-0.3133**	**18.1200**	**-0.2908**	**19.6960**	**-0.2715**	**21.2680**	**-0.2546**
Timber tree	1.80	13.99	15.52	17.05	18.58								
Regeneratiom forest	2.00	13.60	15.13	16.67	18.20								

Annex 11: Slovenia energy balance and renewable energy sources

Slovenia energy balance 2008 (Eurostat Energy balance sheets 2007-2008)

unit= ktoe	**Total all products**	Hard coal	Coke	Total lignite	Crude oil	**Total pet. products**	LPG	Motor spirit	Kero-senes, jet fuels	Gas / diesel oil	Resi-dual fuel oil	Other pet. products	Natural gas	Nuclear heat	**Total renew. energy**	Biomass	Hydro energy	Other fuels	Derived heat	Electrical energy
Primary production	**3641**	0	0	1185	0	**0**	0	0	0	0	0	0	3	1618	**835**	490	345	0	0	0
Recovered products	**15**	0	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**	0	0	15	0	0
Imports	**5517**	363	23	55	0	**3650**	96	807	35	2375	81	11	876	0	**15**	15	0	0	0	535
Stock change	**-144**	80	3	16	0	**52**	2	25	2	30	2	0	0	0	**0**	0	0	0	0	0
Exports	**1228**	1	0	0	0	**555**	12	105	1	396	3	2	0	0	**0**	0	0	0	0	672
Bunkers	**64**	0	0	0	0	**64**	0	0	0	0	64	0	0	0	**0**	0	0	0	0	0
Gross inland consumption	**7736**	282	27	1225	0	**2979**	81	677	36	1949	16	9	879	1618	**850**	505	345	15	0	138
Transformation input	**3278**	207	0	1223	1	**8**	0	0	0	6	2	0	139	1618	**82**	82	0	0	0	0
Public thermal power stations	**1557**	196	0	1223	0	**4**	0	0	0	3	1	0	75	0	**60**	60	0	0	0	0
Autoprod. thermal power stations	**48**	10	0	0	0	**1**	0	0	0	0	1	0	21	0	**16**	16	0	0	0	0
Nuclear power stations	**1618**	0	0	0	0	**0**	0	0	0	0	0	0	0	1618	**0**	0	0	0	0	0
Refineries	**1**	0	0	0	1	**0**	0	0	0	0	0	0	0	0	**0**	0	0	0	0	0
District heating plants	**53**	0	0	0	0	**3**	0	0	0	3	0	0	44	0	**6**	6	0	0	0	0
Transformation output	**1288**	0	0	0	0	**1**	0	0	0	0	0	0	0	0	**0**	0	0	0	223	1065
Public thermal power stations	**672**	0	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**	0	0	0	170	501
Autoprod. thermal power stations	**27**	0	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**	0	0	0	3	24
Nuclear power stations	**539**	0	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**	0	0	0	0	539
Refineries	**1**	0	0	0	0	**1**	0	0	0	0	0	0	0	0	**0**	0	0	0	0	0
District heating plants	**49**	0	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**	0	0	0	49	0
Exchanges and transfers, returns	-	0	0	0	0	**0**	0	0	0	0	0	0	0	0	**345**	0	345	0	0	345
Consumption of the energy branch	**112**	0	0	0	0	**0**	0	0	0	0	0	0	3	0	**0**	0	0	0	7	102
Distribution losses	**101**	0	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**	0	0	0	31	70
Available for final consumption	**5534**	75	27	2	1	**2973**	81	677	36	1943	14	9	736	0	**423**	423	0	14	184	1101
Final non-energy consumption	**283**	1	4	0	0	**182**	1	0	0	0	0	9	96	0	**0**	0	0	0	0	0
Chemical industry	**100**	0	0	0	0	**4**	1	0	0	0	0	0	96	0	**0**	0	0	0	0	0
Other sectors	**182**	1	4	0	0	**178**	0	0	0	0	0	9	0	0	**0**	0	0	0	0	0

/continued	**Total all products**	Hard coal	Coke	Total lignite	Crude oil	**Total pet. products**	LPG	Motor spirit	Kero-senes, jet fuels	Gas / diesel oil	Resi-dual fuel oil	Other pet. products	Natural gas	Nuclear heat	**Total renew. energy**	Biomass	Hydro energy	Other fuels	Derived heat	Electrical energy
Final energy consumption	**5232**	57	22	0	0	**2790**	80	677	36	1943	14	0	640	0	**423**	423	0	14	184	1101
Industry	**1480**	57	22	0	0	**174**	20	0	0	101	14	0	526	0	**75**	75	0	14	69	543
Iron & steel industry	**155**	0	7	0	0	**7**	7	0	0	0	0	0	73	0	**0**	0	0	0	3	66
Non-ferrous metal industry	**144**	0	1	0	0	**5**	0	0	0	2	3	0	27	0	**0**	0	0	0	0	110
Chemical industry	**160**	0	0	0	0	**10**	1	0	0	4	5	0	57	0	**11**	11	0	2	26	53
Glass, pottery & building mat. industry	**268**	36	14	0	0	**49**	4	0	0	5	1	0	112	0	**1**	1	0	12	0	44
Ore-extraction industry	**15**	0	0	0	0	**6**	1	0	0	5	0	0	3	0	**0**	0	0	0	0	7
Food, drink & tobacco industry	**80**	0	0	0	0	**15**	1	0	0	12	2	0	35	0	**0**	0	0	0	4	25
Textile, leather & clothing industry	**45**	0	0	0	0	**4**	0	0	0	2	2	0	21	0	**3**	3	0	0	1	16
Paper and printing	**194**	21	0	0	0	**4**	1	0	0	1	2	0	103	0	**7**	7	0	0	1	58
Engineering & other metal industry	**199**	0	0	0	0	**18**	5	0	0	13	0	0	62	0	**0**	0	0	0	17	102
Other industries	**221**	0	0	0	0	**57**	1	0	0	56	0	0	35	0	**52**	52	0	0	16	61
Transport	**2052**	0	0	0	0	**2013**	2	673	35	1303	0	0	0	0	**22**	22	0	0	0	17
Railways	**29**	0	0	0	0	**12**	0	0	0	12	0	0	0	0	**0**	0	0	0	0	17
Road transport	**1987**	0	0	0	0	**1965**	2	672	0	1291	0	0	0	0	**22**	22	0	0	0	0
Air transport	**36**	0	0	0	0	**36**	0	1	35	0	0	0	0	0	**0**	0	0	0	0	0
Inland navigation -		0	0	0	0	**0**	0	0	0	0	0	0	0	0	**0**	0	0	0	0	0
Households, commerce, pub. auth., etc.	**1700**	0	0	0	0	**603**	58	4	1	539	0	0	114	0	**326**	326	0	0	116	542
Households	**1110**	0	0	0	0	**310**	38	0	0	272	0	0	102	0	**324**	324	0	0	100	274
Agriculture	**73**	0	0	0	0	**73**	0	4	0	69	0	0	0	0	**0**	0	0	0	0	0
Statistical difference	**19**	17	0	2	1	**1**	0	0	0	0	0	0	0	0	**0**	0	0	0	0	0

Renewable energy sources

Primary production	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Total primary production in 1000 toe	714	822	774	768	726	835
Hydro (excl. pumping)	254	352	298	309	281	345
Wind	-	-	-	-	-	-
Solar	-	-	-	-	-	-
Geothermal	-	-	-	-	-	-
Biomass	460	470	476	459	445	490
among which:						
Wood, wood-waste	454	463	469	449	429	469
Municipal solid waste	-	-	-	-	-	-
Biogas	6	7	7	8	12	14
Gross inland consumption	714	822	774	768	735	850
Inputs to electricity and heat production						
in 1000 toe						
Geothermal	-	-	-	-	-	-
Biomass	36	40	37	37	34	82
among which:						
Wood, wood-waste	32	35	31	30	23	70
Municipal waste	-	-	-	-	-	-
Biogas	5	5	5	7	10	12
Final consumption of RES (excl. electricity)						
Total in 1000 toe	423	430	440	422	420	423
by sector:						
Industry	97	104	113	95	81	75
Services & households etc.	326	326	327	326	326	326
Transport	-	-	-	2	13	22
by source:						
Biomass	423	430	440	422	420	423
among which:						
Wood, wood-waste	422	428	438	419	405	399
Municipal waste	-	-	-	-	-	-
Biogas	1	2	1	1	2	2
Geothermal	-	-	-	-	-	-
Electricity generation from RES						
in GWh						
Solar photovoltaics	-	-	-	-	-	1
Hydro with installed capacity < 1 MW	140	238	236	274	260	264
Hydro with installed capacity > 1 & <10 MW	126	199	147	151	149	193
Hydro with installed capacity > 10 MW	2 690	3 658	3 078	3 166	2 856	3 561
Wood, Wood-waste	98	90	82	76	65	232
Municipal waste	-	-	-	-	-	-
Biogas	24	30	32	35	48	56
Electrical capacities of RES						
in MW						
Solar photovoltaics (peak)	-	-	-	-	-	-
Hydro with installed capacity < 1 MW	115	106	107	107	118	117
Hydro with installed capacity > 1 & <10 MW	36	37	36	36	33	37
Hydro with installed capacity > 10 MW	831	831	836	866	867	873
Wood, Wood-waste	13	13	13	14	14	48
Municipal waste	-	-	-	-	-	-
Biogas	3	5	5	6	8	9
Liquid biofuels						
Production 1000 t -	-	-	2	5	8	
Solar Panels						
Solar panel surface 1000 m² -	-	-	-	-	-	

Annex 12: Summary tables of supply, demand and balance categories by County (Obcina)

Table A12.1: Biomass stock and supply categories – Summary by County (Obcina)

			Total woody biomass from direct sources				Non-timber woody biomass from direct sources		
	AREA	stock of biomass (woody and leaves, above and below ground) in woody vegetation from forests and other LU classes	Stock of dendromass from forests and other LU classes (above ground woody biomass)	MAI of dendromass from forests and other LU classes (above ground woody biomass)	Allowable cut of dendromass from forests and other LU classes	Recorded actual cut of dendromass from forests and other LU classes	MAI of non-timber woody biomass from forests and other LU classes	Allowable cut of non-timber woody biomass from forests and other LU classes	Recorded actual cut of non-timber woody biomass from forests and other LU classes
Unit:	ha	od t	od t	od t/yr	od t/yr	od t/yr	od t/yr	od t/yr	od t/yr
Slovenia Total:	**2,026,655**	**255,851,147**	**200,348,232**	**5,024,875**	**3,206,519**	**2,218,126**	**3,089,289**	**1,868,773**	**1,332,867**
ID County/Mapname:		biomass_stk	d_mass_stk	d_mass_mai	d_mass_acut	d_mass_cut	d_e_mai	d_e_acut	d_e_cut
1 AJDOVè╚INA	24,523	2,799,220	2,183,800	52,900	38,310	26,115	37,029	26,156	18,712
2 BELTINCI	6,225	267,899	207,179	5,602	3,640	2,691	4,963	3,178	2,375
3 BLED	7,228	1,007,970	797,852	18,323	10,736	7,268	9,346	4,792	3,383
4 BOHINJ	33,373	4,513,160	3,576,580	70,197	35,962	26,317	32,114	16,816	12,458
5 BOROVNICA	4,232	502,248	394,197	8,581	5,433	3,746	5,299	2,794	1,999
6 BOVEC	36,731	3,590,530	2,799,270	48,785	23,446	18,180	28,878	17,072	13,885
7 BRDA	7,195	451,910	349,432	12,080	10,102	7,832	11,112	9,348	7,348
8 BREZOVICA	9,116	1,019,400	800,274	18,395	10,742	7,602	10,913	5,523	4,069
9 BREÄICE	26,799	2,304,180	1,782,980	51,313	28,312	21,000	37,106	20,739	15,996
10 TIèINA	3,881	150,762	116,435	3,185	2,173	1,626	2,781	1,897	1,444
11 CELJE	9,490	839,151	656,607	16,483	11,047	7,908	11,501	7,277	5,420
12 CERKLJE NA GORENJSKEM	7,803	830,198	652,412	16,290	10,593	7,210	9,421	5,452	3,892
13 CERKNICA	24,131	2,876,240	2,263,810	57,002	33,895	23,130	34,120	17,429	12,385
14 CERKNO	13,162	1,865,180	1,456,060	36,502	27,468	18,585	24,297	16,819	11,660
15 ╚RENèOVCI	3,369	232,719	179,716	6,585	4,034	2,856	5,121	3,011	2,174
16 ╚RNA NA KOROèKEM	15,596	2,649,860	2,112,010	50,206	25,192	16,689	19,966	9,889	6,707
17 ╚RNOMELJ	33,953	4,291,380	3,333,850	98,632	55,715	37,351	71,373	36,260	25,286
18 DESTRNIK	3,436	251,856	195,602	6,030	3,656	2,618	4,107	2,598	1,930
19 DIVA╚A	14,505	1,624,210	1,263,730	34,950	24,820	17,136	28,506	19,369	13,488
20 DOBREPOLJE	10,315	1,673,070	1,303,660	28,623	18,659	12,714	18,363	10,851	7,477
21 DOBROVA-POLHOV GRADEC	11,748	1,740,100	1,356,210	33,189	20,268	13,837	21,277	12,360	8,633
22 DOL PRI LJUBLJANI	3,329	332,463	260,043	6,767	4,148	2,899	4,518	2,666	1,966
23 DOMÄALE	7,229	558,033	438,661	11,723	7,092	5,096	7,126	4,396	3,332
24 DORNAVA	2,840	203,396	157,921	5,285	2,772	1,983	3,664	1,959	1,446
25 DRAVOGRAD	10,500	1,389,150	1,103,930	24,759	16,906	11,510	10,806	7,225	5,170
26 DUPLEK	3,999	334,087	259,156	8,017	4,394	3,177	5,809	3,041	2,275
27 GORENJA VAS-POLJANE	15,327	2,551,050	2,001,980	45,464	35,003	23,647	25,437	18,088	12,540
28 GORIèNICA	2,910	98,553	76,186	2,482	1,277	988	1,843	1,037	831
29 GORNJA RADGONA	7,461	606,723	471,173	1,712	7,787	5,791	8,011	5,438	4,189
30 GORNJI GRAD	9,009	1,718,820	1,361,230	33,079	20,161	13,479	14,965	8,633	5,934
31 GORNJI PETROVCI	6,684	581,519	455,863	11,057	6,248	4,485	8,559	4,709	3,443
32 GROSUPLJE	13,380	1,515,580	1,184,400	28,084	17,074	11,972	17,345	10,253	7,439

33 èALOVCI	5,813	470,332	368,510	8,688	5,518	3,922	6,548	3,974	2,888
34 HRASTNIK	5,857	823,858	639,332	11,428	6,653	4,701	7,056	4,064	2,980
35 HRPELJE-KOZINA	19,491	1,569,800	1,224,700	39,922	23,070	16,210	34,742	19,716	13,985
36 IDRIJA	**29,369**	4,940,360	3,860,190	93,768	60,667	40,644	59,070	35,595	24,364
37 IG	9,879	1,129,700	884,020	22,820	11,756	8,195	12,926	6,506	4,672
38 ILIRSKA BISTRICA	47,979	6,784,990	5,299,870	159,098	88,608	60,520	119,347	60,567	41,904
39 IVAN L̈NA GORICA	22,700	2,711,470	2,114,920	51,886	34,774	27,579	34,800	24,362	17,104
40 IZOLA	2,856	71,150	54,970	2,144	1,645	1,568	2,115	1,639	1,561
41 JESENICE	7,583	1,150,000	908,380	18,087	10,542	7,167	8,184	4,452	3,205
42 JURèINCI	3,626	326,195	252,811	8,494	5,112	3,626	5,553	3,414	2,509
43 KAMNIK	26,565	3,557,180	2,788,980	64,605	36,954	25,479	37,299	21,507	15,303
44 KANAL	14,651	2,046,630	1,582,800	40,055	21,972	14,951	32,536	17,511	12,051
45 KIDRI L̈EVO	7,151	326,776	257,980	7,428	5,544	3,904	4,667	3,739	2,710
46 KOBARID	19,272	2,340,920	1,812,190	50,597	31,626	21,822	40,357	25,197	17,810
47 KOBILJE	1,974	202,623	157,774	3,776	2,686	1,841	2,953	1,967	1,360
48 KO L̈EVJE	55,516	11,097,600	8,676,590	215,091	152,592	102,275	112,292	71,193	48,355
49 KOMEN	10,272	499,992	391,871	10,999	9,265	6,795	9,542	7,933	5,930
50 KOPER	31,061	1,509,550	1,174,490	34,113	22,665	18,017	31,832	21,157	16,936
51 KOZJE	8,969	1,155,500	895,252	23,715	17,948	12,406	16,119	11,328	8,026
52 KRANJ	15,093	1,773,130	1,394,160	35,181	22,911	15,741	19,307	11,551	8,206
53 KRANJSKA GORA	25,631	3,007,090	2,375,330	44,727	22,146	15,442	19,832	10,684	7,994
54 KRèKO	28,651	2,970,280	2,300,820	67,323	38,074	27,292	48,296	27,184	20,037
55 KUNGOTA	4,898	473,023	367,236	9,960	6,458	4,770	6,135	4,129	3,239
56 KUZMA	2,283	198,500	155,566	3,647	2,621	1,864	2,628	1,801	1,292
57 LAèKO	19,747	2,801,650	2,176,040	55,342	36,531	25,139	41,745	25,386	17,829
58 LENART	6,174	449,861	349,141	10,159	6,449	4,698	6,756	4,353	3,309
59 LENDAVA	12,156	676,002	522,146	16,544	11,847	8,742	12,452	8,858	6,739
60 LITIJA	22,138	3,306,190	2,575,220	63,139	37,030	25,296	40,748	23,011	16,084
61 LJUBLJANA	27,499	2,388,290	1,858,190	44,186	27,305	19,827	30,562	18,487	14,008
62 LJUBNO	7,890	1,416,840	1,126,410	30,000	17,552	11,761	14,195	7,440	5,074
63 LJUTOMER	10,721	759,582	588,480	13,998	10,429	7,760	10,557	7,910	6,075
64 LOGATEC	17,311	2,317,110	1,829,690	50,345	32,838	22,216	24,819	13,946	9,786
65 LOèKA DOLINA	16,610	3,671,520	2,890,950	65,583	57,308	38,205	30,683	22,050	14,887
66 LOèKI POTOK	13,429	2,684,930	2,118,560	46,441	33,813	22,465	25,745	16,952	11,583
67 LU L̈E	10,945	1,864,310	1,480,390	38,540	21,806	14,597	16,079	9,175	6,295
68 LUKOVICA	7,490	970,372	761,215	18,559	12,265	8,457	11,219	6,982	4,945
69 MAJèPERK	7,278	1,090,870	844,836	20,855	15,188	10,472	13,318	9,327	6,561
70 MARIBOR	14,745	1,408,310	1,099,770	32,163	19,455	14,065	19,423	11,623	8,929
71 MEDVODE	7,760	1,023,930	800,458	20,267	9,941	6,806	11,948	5,633	3,992
72 MENGEè	2,246	195,214	152,613	3,984	2,398	1,656	2,487	1,457	1,044
73 METLIKA	10,871	1,140,430	887,352	27,902	16,793	11,764	20,287	11,790	8,503
74 MEÄICA	2,645	336,548	267,156	7,599	3,295	2,268	4,171	1,584	1,130
75 MIREN-KOSTANJEVICA	6,275	261,236	204,389	5,571	4,827	3,600	5,076	4,485	3,372
76 MISLINJA	11,216	1,923,560	1,533,270	34,994	20,867	13,970	13,164	7,945	5,514
77 MORAV L̈E	6,138	820,693	639,272	17,717	12,244	8,427	11,793	7,519	5,306
78 MORAVSKE TOPLICE	14,446	1,000,490	777,796	22,108	11,365	8,239	18,087	9,240	6,805
79 MOZIRJE	5,354	810,159	642,389	15,854	9,128	6,245	7,599	4,110	2,913
80 MURSKA SOBOTA	6,444	207,797	160,477	4,930	3,206	2,443	4,564	2,979	2,288
81 MUTA	3,877	454,783	362,203	7,835	4,772	3,269	3,549	2,155	1,564
82 NAKLO	2,829	332,732	262,615	6,950	3,868	2,734	3,937	1,818	1,299
83 NAZARJE	4,340	834,055	658,891	17,128	11,072	7,356	9,080	5,460	3,721
84 NOVA GORICA	27,948	3,443,040	2,683,050	67,343	42,688	29,515	49,055	30,199	21,448

85 NOVO MESTO	23,569	3,223,060	2,508,170	72,353	49,592	33,862	47,120	31,252	21,975
86 ODRANCI	694	11,565	8,931	257	169	143	221	151	131
87 ORMOÄ	14,149	1,134,430	878,734	24,620	17,015	12,505	16,414	11,679	8,956
88 OSILNICA	3,588	517,394	403,916	9,728	5,262	3,471	5,155	2,904	1,992
89 PESNICA	7,584	436,638	337,565	9,757	6,823	5,298	6,797	4,933	4,042
90 PIRAN	4,434	111,046	85,853	2,939	2,231	2,087	2,879	2,204	2,068
91 PIVKA	22,324	2,955,930	2,319,910	54,183	38,864	26,652	35,502	22,196	15,534
92 POD LETRTEK	6,056	635,077	492,421	13,011	8,643	6,215	9,896	6,108	4,525
93 PODVELKA	10,386	1,940,930	1,537,300	40,039	23,477	15,683	17,731	8,839	6,051
94 POSTOJNA	26,989	3,646,160	2,857,540	80,799	45,768	31,338	50,746	25,831	18,142
95 PREDDVOR	8,695	1,423,650	1,121,650	22,660	12,421	8,474	10,995	6,182	4,347
96 PTUJ	6,665	358,583	278,248	8,728	5,704	4,218	6,395	4,276	3,297
97 PUCONCI	10,766	745,136	581,669	13,978	9,034	6,526	10,806	6,884	5,085
98 RA LE-FRAM	5,123	381,586	299,036	9,793	5,442	3,882	5,918	3,354	2,507
99 RADE LE	5,198	816,643	634,747	16,835	12,711	8,719	11,191	7,052	4,881
100 RADENCI	3,413	220,855	171,232	915	2,850	2,204	3,248	2,284	1,826
101 RADLJE OB DRAVI	9,394	1,333,640	1,061,930	25,326	15,421	10,390	10,223	5,851	4,112
102 RADOVLJICA	11,870	1,632,690	1,284,130	29,908	16,169	11,356	15,596	7,689	5,573
103 RAVNE NA KOROèKEM	6,345	939,414	745,713	16,248	10,874	7,350	6,949	4,762	3,385
104 RIBNICA	15,365	2,784,600	2,192,110	52,754	40,611	27,327	26,714	17,780	12,288
105 ROGAèOVCI	4,010	200,208	156,028	3,836	2,781	2,093	3,109	2,218	1,710
106 ROGAèKA SLATINA	7,154	743,356	575,513	15,065	11,745	8,292	11,346	8,670	6,274
107 ROGATEC	3,956	536,042	414,986	11,098	6,853	4,717	9,148	5,412	3,790
108 RUèE	6,081	1,412,160	1,112,880	29,433	18,860	12,531	12,178	7,115	4,817
109 SEMI L	14,667	2,915,530	2,273,460	62,667	47,416	31,691	35,475	25,385	17,300
110 SEVNICA	27,216	3,719,770	2,887,950	80,527	47,380	32,849	52,954	29,732	21,121
111 SEÄANA	21,737	1,374,360	1,074,270	28,263	20,652	14,943	23,953	17,337	12,769
112 SLOVENJ GRADEC	17,370	2,368,190	1,883,170	45,007	28,767	19,415	18,533	11,560	8,225
113 SLOVENSKA BISTRICA	26,008	3,521,580	2,774,620	72,728	45,951	31,602	36,661	21,703	15,544
114 SLOVENSKE KONJICE	9,785	1,093,210	850,775	21,853	16,434	11,475	14,469	10,574	7,647
115 STARèE	3,397	171,579	135,262	4,340	2,383	1,692	2,740	1,511	1,099
116 SVETI JURIJ	5,132	425,835	331,126	1,035	5,241	3,758	5,044	3,536	2,613
117 èEN LUR	4,029	303,964	241,493	6,683	4,493	2,964	3,278	1,929	1,383
118 èENTILJ	6,501	706,784	547,276	14,605	10,627	7,565	8,829	6,490	4,827
119 èENTJERNEJ	9,597	1,031,580	800,266	20,974	13,619	9,490	13,001	8,629	6,201
120 èENTJUR	22,227	2,676,210	2,083,240	54,798	38,828	27,028	38,304	24,771	17,767
121 èKOCJAN	6,045	573,013	444,974	12,360	6,847	4,920	8,278	4,762	3,519
122 èKOFJA LOKA	14,599	2,249,210	1,766,040	40,869	26,989	18,225	20,970	13,249	9,240
123 èKOFLJICA	4,330	353,745	275,477	7,341	4,213	3,027	5,107	2,872	2,159
124 èMARJE PRI JELèAH	10,770	1,053,900	817,297	22,961	16,064	11,421	17,092	11,331	8,293
125 èMARTNO OB PAKI	1,815	240,613	188,307	4,930	3,679	2,540	3,004	1,962	1,403
126 èOèTANJ	9,558	1,609,660	1,275,220	33,100	19,167	12,929	14,831	8,034	5,626
127 èTORE	2,815	403,007	313,285	7,788	5,065	3,505	5,517	3,188	2,261
128 TOLMIN	38,152	6,053,710	4,695,000	102,536	69,160	47,285	72,423	47,368	32,831
129 TRBOVLJE	5,803	976,316	761,139	16,601	9,502	6,694	8,971	5,401	3,855
130 TREBNJE	19,465	2,345,390	1,826,550	52,282	29,628	20,528	36,131	20,240	14,339
131 TRÄI L	15,536	2,889,990	2,287,870	49,560	32,075	21,780	23,641	12,601	8,785
132 TURNIè LE	2,384	71,243	55,021	1,723	1,731	1,264	1,262	1,130	863
133 VELENJE	8,351	1,183,310	929,639	22,903	16,008	11,006	12,498	8,088	5,790
134 VELIKE LAè LE	10,318	1,601,550	1,258,860	30,333	16,669	11,049	16,262	8,184	5,814
135 VIDEM	7,998	621,045	481,221	13,909	8,667	6,318	9,904	6,221	4,690
136 VIPAVA	10,740	1,048,080	819,057	24,026	16,086	11,117	17,402	10,906	7,890

137 VITANJE	5,938	972,914	774,279	19,971	13,442	9,018	9,870	5,965	4,111
138 VODICE	3,137	304,422	240,293	5,240	2,703	1,903	2,651	1,301	965
139 VOJNIK	7,526	975,050	763,397	19,273	13,031	9,147	12,792	7,895	5,653
140 VRHNIKA	11,334	1,405,610	1,102,650	27,290	17,697	12,213	14,533	8,407	6,060
141 VUZENICA	5,010	803,689	639,384	13,658	8,310	5,584	5,678	3,439	2,405
142 ZAGORJE OB SAVI	14,715	2,184,540	1,704,070	37,034	19,710	14,070	20,712	11,471	8,250
143 ZAVR╚	1,933	167,664	129,636	3,874	2,604	1,961	2,861	1,954	1,526
144 ZRE╚E	6,705	939,514	744,647	20,806	13,770	9,432	11,922	6,712	4,695
146 ÄELEZNIKI	16,378	3,327,690	2,631,080	54,526	33,856	22,689	24,536	14,060	9,635
147 ÄIRI	4,920	632,243	499,821	12,219	8,043	5,475	5,913	3,657	2,621
148 BENEDIKT	2,414	182,952	141,930	4,135	2,609	1,882	2,770	1,773	1,323
149 BISTRICA OB SOTLI	3,015	324,133	250,776	7,329	3,830	2,787	5,682	2,914	2,177
150 BLOKE	7,506	713,162	561,007	18,268	9,623	6,753	10,990	5,496	4,051
151 BRASLOV╚E	5,488	493,830	387,274	9,629	6,977	4,862	6,414	4,186	3,011
152 CANKOVA	3,051	157,138	123,137	3,106	2,206	1,604	2,270	1,542	1,153
153 CERKVENJAK	2,453	195,636	151,913	4,455	2,970	2,136	2,902	1,949	1,457
154 DOBJE	1,749	177,489	137,518	3,769	2,654	1,890	2,763	1,840	1,349
155 DOBRNA	3,166	427,562	335,591	9,091	5,267	3,628	6,252	3,519	2,475
156 DOBROVNIK	3,112	222,882	173,321	4,447	2,979	2,122	3,503	2,289	1,664
157 DOLENJSKE TOPLICE	11,021	2,630,620	2,065,180	49,299	42,379	28,212	24,782	19,357	12,978
158 GRAD	3,739	299,329	233,865	5,191	4,259	3,035	3,942	3,145	2,288
159 HAJDINA	2,181	49,625	38,709	1,184	824	675	939	686	583
160 HO╚E-SLIVNICA	5,372	585,098	458,892	14,138	8,763	6,056	7,720	4,804	3,472
161 HODOè	1,810	160,393	125,529	3,051	1,746	1,217	2,344	1,270	907
162 HORJUL	3,255	438,070	342,207	8,679	5,064	3,478	5,344	3,007	2,146
163 JEZERSKO	6,881	1,477,090	1,174,290	23,693	14,587	9,719	10,282	5,160	3,506
164 KOMENDA	2,406	165,052	130,036	3,151	1,741	1,204	1,804	984	742
165 KOSTEL	5,560	877,509	683,997	18,683	9,540	6,422	10,954	5,194	3,579
166 KRIÄEVCI	4,625	243,542	189,050	4,313	2,861	2,099	3,191	2,110	1,591
167 LOVRENC NA POHORJU	8,443	1,970,060	1,560,480	36,291	22,133	14,680	13,211	7,219	4,889
168 MARKOVCI	2,984	76,451	59,268	1,947	985	761	1,506	795	637
169 MIKLAVÄ NA DRAVSKEM POLJU	1,253	55,572	43,745	1,548	778	571	1,079	547	412
170 MIRNA PE╚	4,803	678,748	527,452	16,523	12,100	8,203	11,505	7,655	5,298
171 OPLOTNICA	3,315	316,210	248,998	6,124	4,074	2,905	3,618	2,194	1,664
172 PODLEHNIK	4,598	554,357	429,049	12,538	7,671	5,462	8,700	5,256	3,856
173 POLZELA	3,400	330,743	258,543	6,037	4,904	3,421	4,104	3,202	2,306
174 PREBOLD	4,074	521,813	406,451	10,529	7,669	5,248	7,512	5,141	3,560
175 PREVALJE	5,808	852,567	678,373	14,627	9,894	6,744	6,475	4,390	3,120
176 RAZKRIÄJE	983	75,446	58,264	1,153	981	722	867	717	547
177 RIBNICA NA POHORJU	5,931	1,192,290	946,846	22,720	10,761	7,166	8,768	3,699	2,535
178 SELNICA OB DRAVI	6,447	952,908	752,720	23,329	12,091	8,159	11,264	5,534	3,867
179 SODRAÄICA	4,948	854,807	670,913	17,315	11,641	7,949	9,765	6,091	4,235
180 SOL╚AVA	10,276	1,634,030	1,292,790	29,238	12,754	8,750	9,914	4,847	3,478
181 SVETA ANA	3,716	323,691	251,253	7,246	4,769	3,379	4,556	3,019	2,214
182 SVETI ANDRAÄ V SLOV. GORICAH	1,760	121,168	94,147	2,989	1,857	1,340	2,013	1,298	973
183 èEMPETER-VRTOJBA	1,495	66,984	51,735	2,330	2,173	1,643	1,988	1,874	1,444
184 TABOR	3,485	486,355	380,650	10,073	6,750	4,575	6,507	3,981	2,756
185 TRNOVSKA VAS	2,289	155,216	120,524	3,538	1,939	1,401	2,302	1,334	1,006
186 TRZIN	862	58,724	45,912	1,241	774	552	796	493	367
187 VELIKA POLANA	1,867	148,207	114,448	4,600	3,022	2,135	3,382	2,057	1,489
188 VERÄEJ	1,202	82,252	63,518	990	911	657	681	612	457
189 VRANSKO	5,331	843,214	659,063	15,705	12,143	8,180	10,920	7,604	5,230

190 ÄALEC	11,710	1,088,430	849,822	21,720	16,565	11,556	16,017	11,790	8,440
191 ÄETALE	3,802	675,401	522,739	13,855	9,597	6,596	8,929	5,938	4,167
192 ÄIROVNICA	4,259	504,844	398,426	8,224	4,795	3,338	3,930	2,236	1,669
193 ÄUÄEMBERK	16,435	2,563,990	1,991,340	49,491	35,636	24,402	35,430	23,383	16,159
194 èMARTNO PRI LITIJI	9,489	1,425,290	1,111,270	26,874	15,078	10,286	17,915	9,597	6,705
195 APA LE	5,349	325,937	252,903	680	4,117	3,000	4,362	2,962	2,193
196 CIRKULANE	3,205	290,367	224,716	6,267	4,090	3,025	4,516	2,973	2,280
197 KOSTANJEVICA NA KRKI	5,833	1,026,390	795,772	20,442	12,831	8,820	12,927	7,790	5,434
198 MAKOLE	3,693	536,911	416,172	12,238	6,887	4,779	7,636	4,145	2,950
199 MOKRONOG-TREBELNO	7,344	1,040,150	806,218	27,191	13,826	9,481	19,013	9,365	6,544
200 POLJ LANE	3,751	528,221	408,977	11,376	6,673	4,633	7,220	4,067	2,903
201 REN LE-VOGRSKO	2,946	206,627	160,086	5,538	4,429	3,186	5,037	4,032	2,921
202 SREDIè LE OB DRAVI	3,269	296,658	230,429	5,720	3,799	2,649	4,056	2,802	1,984
203 STRAÄA	2,853	428,850	336,987	9,033	6,187	4,203	4,224	2,862	2,025
204 SV. TROJICA V SLOV. GORICAH	2,626	173,353	134,908	3,920	2,542	1,840	2,557	1,666	1,258
205 SVETI TOMAÄ	3,808	325,830	252,737	7,100	4,404	3,128	4,703	2,916	2,141
206 èMARJEèKE TOPLICE	3,423	246,318	190,578	5,743	3,825	2,795	4,269	2,880	2,171
207 GORJE	11,621	2,077,030	1,651,660	33,503	19,260	12,879	14,072	6,879	4,808
208 LOG-DRAGOMER	1,293	115,114	89,758	2,210	1,428	1,007	1,393	849	625
209 RE ICA OB SAVINJI	3,012	444,446	352,530	9,027	4,973	3,384	4,259	2,190	1,555
210 SVETI JURIJ V SLOV. GORICAH	3,071	206,478	160,163	4,784	3,143	2,294	3,295	2,194	1,668
211 èENTRUPERT	4,902	617,315	479,421	14,974	7,812	5,403	10,069	5,170	3,686

Table A12.1: Continued: Supply categories

					"fiber" feedstock potential		
		Woody biomass residues from indirect sources (wood processing industries)	Legally accessible non-timber woody biomass from direct and indirect sources	Recorded actual cut of non-timber woody biomass from direct and indirect sources	Allowable cut of non-timber assortments suitable for fiber industries in forest compartments plus industrial wood residues	Recorded actual cut of non-timber assortments suitable for fiber industries in forest compartments plus industrial wood residues	Crop residues (non-woody) at crop site estimated available for energy uses
	Unit:	od t/yr	od t/yr	od t/yr	od t/yr	od t/yr	od t/yr
	Slovenia Total:	**141,793**	**2,010,566**	**1,474,660**	**1,237,915**	**970,217**	**197,485**
ID	County \ Mapname:	res_kg	legac_de_res	cut_de_res	acutres_fib	cutres_fib	agres_dmkg
1	AJDOVè╚INA	2,793	28,949	21,505	18,293	15,319	2,524
2	BELTINCI	188	3,366	2,563	208	639	3,508
3	BLED	40	4,832	3,423	3,860	2,545	116
4	BOHINJ	480	17,296	12,938	12,710	8,486	80
5	BOROVNICA	0	2,794	1,999	1,942	1,289	117
6	BOVEC	0	17,072	13,885	7,106	5,308	43
7	BRDA	0	9,348	7,348	0	1,800	4,259
8	BREZOVICA	56	5,579	4,125	3,604	2,406	352
9	BREÄICE	0	20,739	15,996	4,306	7,168	6,793
10	TIèINA	0	1,897	1,444	61	255	1,888
11	CELJE	196	7,473	5,616	4,335	3,031	772
12	CERKLJE NA GORENJSKEM	0	5,452	3,892	3,711	2,449	1,326
13	CERKNICA	396	17,825	12,781	12,395	8,475	372
14	CERKNO	38	16,857	11,698	12,750	8,499	307
15	╚RENèOVCI	103	3,114	2,277	120	617	1,113
16	╚RNA NA KOROèKEM	0	9,889	6,707	8,021	5,228	70
17	╚RNOMELJ	5,114	41,374	30,400	19,562	19,848	2,172
18	DESTRNIK	0	2,598	1,930	1,467	1,025	958
19	DIVA ╚A	186	19,555	13,674	5,739	6,575	205
20	DOBREPOLJE	488	11,339	7,965	8,450	5,956	219
21	DOBROVA-POLHOV GRADEC	260	12,620	8,893	10,522	7,127	257
22	DOL PRI LJUBLJANI	160	2,826	2,126	1,644	1,257	452
23	DOMÄALE	1,261	5,657	4,593	3,730	2,895	678
24	DORNAVA	0	1,959	1,446	752	636	1,037
25	DRAVOGRAD	12,591	19,816	17,761	17,697	15,931	631
26	DUPLEK	24	3,065	2,299	1,363	1,127	1,017
27	GORENJA VAS-POLJANE	2,888	20,976	15,428	17,747	13,209	267
28	GORIèNICA	0	1,037	831	59	164	1,446
29	GORNJA RADGONA	918	6,356	5,107	3,048	2,408	2,540
30	GORNJI GRAD	295	8,928	6,229	7,891	5,287	150
31	GORNJI PETROVCI	40	4,749	3,483	602	1,051	1,548
32	GROSUPLJE	99	10,352	7,538	7,262	4,856	501
33	èALOVCI	47	4,021	2,935	515	917	1,537
34	HRASTNIK	0	4,064	2,980	2,419	1,911	330
35	HRPELJE-KOZINA	0	19,716	13,985	1,837	5,189	264
36	**IDRIJA**	3,260	38,855	27,624	33,329	23,758	192
37	IG	689	7,195	5,361	5,531	3,905	582

38 ILIRSKA BISTRICA	4,215	64,782	46,119	31,250	26,861	1,017
39 IVAN LNA GORICA	735	25,097	17,839	17,269	12,460	1,617
40 IZOLA	0	1,639	1,561	0	34	1,181
41 JESENICE	0	4,452	3,205	3,366	2,210	65
42 JURèINCI	0	3,414	2,509	1,268	1,215	1,216
43 KAMNIK	2,250	23,757	17,553	18,767	13,256	643
44 KANAL	12	17,523	12,063	3,872	6,668	285
45 KIDRI LEVO	0	3,739	2,710	420	408	2,903
46 KOBARID	0	25,197	17,810	8,928	10,280	125
47 KOBILJE	0	1,967	1,360	191	600	535
48 KO LEVJE	16,269	87,462	64,624	74,736	56,849	301
49 KOMEN	0	7,933	5,930	273	709	555
50 KOPER	0	21,157	16,936	0	1,994	4,924
51 KOZJE	36	11,364	8,062	4,709	5,696	724
52 KRANJ	2,802	14,353	11,009	11,076	8,295	1,978
53 KRANJSKA GORA	1,200	11,884	9,194	8,319	5,900	44
54 KRèKO	1,062	28,246	21,099	11,302	11,025	5,822
55 KUNGOTA	67	4,196	3,306	2,173	1,575	1,218
56 KUZMA	0	1,801	1,292	867	586	444
57 LAèKO	1,064	26,450	18,893	19,079	14,303	983
58 LENART	24	4,377	3,333	2,163	1,534	1,564
59 LENDAVA	0	8,858	6,739	15	1,945	4,639
60 LITIJA	3,987	26,998	20,071	21,187	15,760	701
61 LJUBLJANA	4,520	23,007	18,528	15,224	12,168	1,484
62 LJUBNO	692	8,132	5,766	6,985	4,788	175
63 LJUTOMER	979	8,889	7,054	2,552	2,985	4,527
64 LOGATEC	8,054	22,000	17,840	19,992	15,922	144
65 LOèKA DOLINA	840	22,890	15,727	19,953	13,447	106
66 LOèKI POTOK	360	17,312	11,943	15,974	10,666	41
67 LU LE	314	9,489	6,609	7,895	5,258	64
68 LUKOVICA	1,335	8,317	6,280	6,410	4,697	276
69 MAJèPERK	0	9,327	6,561	4,092	4,208	670
70 MARIBOR	3	11,626	8,932	6,645	4,679	2,928
71 MEDVODE	181	5,814	4,173	4,276	2,903	540
72 MENGEè	0	1,457	1,044	1,067	709	421
73 METLIKA	1,040	12,830	9,543	5,826	4,736	1,750
74 MEÄICA	0	1,584	1,130	1,068	698	61
75 MIREN-KOSTANJEVICA	4,088	8,573	7,460	4,088	4,401	354
76 MISLINJA	1,520	9,465	7,034	8,113	5,814	256
77 MORAV LE	670	8,189	5,976	6,144	4,306	247
78 MORAVSKE TOPLICE	60	9,300	6,865	248	2,253	4,977
79 MOZIRJE	1,560	5,670	4,473	4,778	3,666	212
80 MURSKA SOBOTA	0	2,979	2,288	1	363	2,562
81 MUTA	0	2,155	1,564	1,455	949	206
82 NAKLO	0	1,818	1,299	865	586	439
83 NAZARJE	1,200	6,660	4,921	6,150	4,460	109
84 NOVA GORICA	112	30,311	21,560	12,320	11,277	2,646
85 NOVO MESTO	4,237	35,489	26,212	22,863	18,348	2,274
86 ODRANCI	240	391	371	240	260	522
87 ORMOÄ	127	11,806	9,083	1,985	3,727	5,756
88 OSILNICA	0	2,904	1,992	2,204	1,600	31
89 PESNICA	0	4,933	4,042	1,142	1,494	1,973

90 PIRAN	0	2,204	2,068	0	95	1,359
91 PIVKA	1,376	23,572	16,910	12,488	9,016	364
92 POD LETRTEK	0	6,108	4,525	2,491	2,728	1,009
93 PODVELKA	876	9,715	6,927	8,252	5,717	172
94 POSTOJNA	0	25,831	18,142	17,694	11,787	393
95 PREDDVOR	240	6,422	4,587	4,974	3,359	174
96 PTUJ	0	4,276	3,297	1,899	1,435	1,869
97 PUCONCI	80	6,964	5,165	1,827	1,713	3,594
98 RA LE-FRAM	138	3,492	2,645	2,096	1,439	1,312
99 RADE LE	136	7,188	5,017	5,140	3,777	280
100 RADENCI	0	2,284	1,826	526	438	1,375
101 RADLJE OB DRAVI	347	6,198	4,459	4,975	3,362	434
102 RADOVLJICA	0	7,689	5,573	5,273	3,473	484
103 RAVNE NA KOROèKEM	0	4,762	3,385	3,281	2,158	251
104 RIBNICA	2,138	19,918	14,426	17,466	12,245	312
105 ROGAèOVCI	160	2,378	1,870	979	730	1,484
106 ROGAèKA SLATINA	186	8,856	6,460	4,181	4,188	862
107 ROGATEC	230	5,642	4,020	2,822	2,974	228
108 RUèE	37	7,152	4,854	6,388	4,223	171
109 SEMI L	64	25,449	17,364	17,333	13,763	503
110 SEVNICA	1,596	31,328	22,717	20,545	15,789	2,430
111 SEÄANA	0	17,337	12,769	682	2,419	1,007
112 SLOVENJ GRADEC	160	11,720	8,385	8,688	5,735	739
113 SLOVENSKA BISTRICA	1,819	23,522	17,363	17,007	11,974	2,916
114 SLOVENSKE KONJICE	2,874	13,448	10,521	10,194	7,958	1,165
115 STARèE	17	1,528	1,116	296	230	1,271
116 SVETI JURIJ	40	3,576	2,653	1,596	1,153	1,657
117 èEN LUR	0	1,929	1,383	1,108	721	1,170
118 èENTILJ	0	6,490	4,827	3,554	2,793	998
119 èENTJERNEJ	968	9,597	7,169	4,356	4,834	1,970
120 èENTJUR	918	25,689	18,685	16,036	12,913	1,732
121 èKOCJAN	10	4,772	3,529	1,917	1,779	917
122 èKOFJA LOKA	3,034	16,283	12,274	13,863	10,362	738
123 èKOFLJICA	0	2,872	2,159	1,816	1,231	283
124 èMARJE PRI JELèAH	465	11,796	8,758	7,640	5,881	1,403
125 èMARTNO OB PAKI	0	1,962	1,403	1,426	945	230
126 èOèTANJ	0	8,034	5,626	6,339	4,154	430
127 èTORE	0	3,188	2,261	2,263	1,651	169
128 TOLMIN	529	47,897	33,360	30,197	23,006	380
129 TRBOVLJE	0	5,401	3,855	4,043	2,763	161
130 TREBNJE	800	21,040	15,139	15,087	10,614	1,622
131 TRÄI L	0	12,601	8,785	10,232	6,733	231
132 TURNIè LE	0	1,130	863	0	146	1,146
133 VELENJE	286	8,374	6,076	6,310	4,269	762
134 VELIKE LAè LE	943	9,127	6,757	7,488	5,274	174
135 VIDEM	0	6,221	4,690	2,094	2,100	2,256
136 VIPAVA	200	11,106	8,090	4,611	4,309	1,656
137 VITANJE	47	6,012	4,158	4,879	3,197	156
138 VODICE	160	1,461	1,125	809	588	373
139 VOJNIK	2,400	10,295	8,053	7,935	6,099	741
140 VRHNIKA	3,908	12,316	9,968	10,526	8,301	362
141 VUZENICA	0	3,439	2,405	2,690	1,764	184

142 ZAGORJE OB SAVI	0	11,471	8,250	8,108	5,438	440
143 ZAVR╚	0	1,954	1,526	284	696	720
144 ZRE╚E	299	7,011	4,994	5,639	3,810	257
146 ÄELEZNIKI	1,322	15,382	10,957	13,540	9,400	180
147 ÄIRI	1,000	4,657	3,621	3,931	2,929	68
148 BENEDIKT	0	1,773	1,323	862	577	567
149 BISTRICA OB SOTLI	469	3,383	2,646	1,401	1,737	598
150 BLOKE	120	5,616	4,171	3,602	2,413	119
151 BRASLOV╚E	480	4,666	3,491	3,367	2,411	1,317
152 CANKOVA	200	1,742	1,353	726	582	1,284
153 CERKVENJAK	0	1,949	1,457	1,035	702	640
154 DOBJE	0	1,840	1,349	848	805	121
155 DOBRNA	311	3,830	2,786	3,055	2,125	209
156 DOBROVNIK	0	2,289	1,664	82	631	1,367
157 DOLENJSKE TOPLICE	760	20,117	13,738	18,248	12,445	364
158 GRAD	0	3,145	2,288	1,424	965	943
159 HAJDINA	0	686	583	62	73	985
160 HO╚E-SLIVNICA	477	5,281	3,949	3,698	2,609	871
161 HODOè	0	1,270	907	161	314	336
162 HORJUL	80	3,087	2,226	2,522	1,724	87
163 JEZERSKO	0	5,160	3,506	4,346	2,845	3
164 KOMENDA	1,320	2,304	2,062	1,808	1,641	440
165 KOSTEL	0	5,194	3,579	3,827	2,612	91
166 KRIÄEVCI	0	2,110	1,591	625	567	1,893
167 LOVRENC NA POHORJU	311	7,530	5,200	6,807	4,576	150
168 MARKOVCI	0	795	637	8	83	1,488
169 MIKLAVÄ NA DRAVSKEM POLJU	0	547	412	150	102	390
170 MIRNA PE╚	120	7,775	5,418	5,361	3,657	566
171 OPLOTNICA	1,528	3,722	3,192	2,852	2,401	543
172 PODLEHNIK	0	5,256	3,856	2,049	2,116	663
173 POLZELA	40	3,242	2,346	2,320	1,555	407
174 PREBOLD	0	5,141	3,560	4,059	2,810	424
175 PREVALJE	0	4,390	3,120	2,792	1,823	287
176 RAZKRIÄJE	0	717	547	37	129	409
177 RIBNICA NA POHORJU	360	4,059	2,895	3,560	2,448	55
178 SELNICA OB DRAVI	244	5,778	4,111	4,346	2,989	406
179 SODRAÄICA	566	6,657	4,801	5,622	3,900	91
180 SOL╚AVA	0	4,847	3,478	3,608	2,359	12
181 SVETA ANA	72	3,091	2,286	1,734	1,198	895
182 SVETI ANDRAÄ V SLOV. GORICAH	0	1,298	973	517	393	565
183 èEMPETER-VRTOJBA	0	1,874	1,444	0	292	668
184 TABOR	320	4,301	3,076	3,512	2,448	339
185 TRNOVSKA VAS	0	1,334	1,006	568	443	768
186 TRZIN	200	693	567	502	399	133
187 VELIKA POLANA	281	2,338	1,770	281	532	477
188 VERÄEJ	0	612	457	0	80	474
189 VRANSKO	0	7,604	5,230	6,275	4,202	325
190 ÄALEC	621	12,411	9,061	8,349	6,125	2,823
191 ÄETALE	0	5,938	4,167	2,708	2,756	292
192 ÄIROVNICA	120	2,356	1,789	1,602	1,095	91
193 ÄUÄEMBERK	163	23,546	16,322	15,641	11,210	498
194 èMARTNO PRI LITIJI	584	10,181	7,289	8,113	5,602	321

195 APA LE	175	3,137	2,368	920	1,154	2,376
196 CIRKULANE	0	2,973	2,280	994	1,075	690
197 KOSTANJEVICA NA KRKI	0	7,790	5,434	3,539	3,433	619
198 MAKOLE	52	4,197	3,002	2,249	1,976	291
199 MOKRONOG-TREBELNO	334	9,699	6,878	6,767	5,106	629
200 POLJ LANE	0	4,067	2,903	2,476	1,861	292
201 REN LE-VOGRSKO	120	4,152	3,041	120	845	791
202 SREDIè LE OB DRAVI	250	3,052	2,234	888	887	1,063
203 STRAÄA	1,091	3,953	3,116	3,200	2,488	375
204 SV. TROJICA V SLOV. GORICAH	24	1,690	1,282	805	592	633
205 SVETI TOMAÄ	0	2,916	2,141	917	1,157	1,027
206 èMARJEèKE TOPLICE	184	3,064	2,355	1,493	1,345	777
207 GORJE	0	6,879	4,808	5,892	3,845	57
208 LOG-DRAGOMER	0	849	625	618	425	98
209 RE LICA OB SAVINJI	1,500	3,690	3,055	3,142	2,574	168
210 SVETI JURIJ V SLOV. GORICAH	48	2,242	1,716	1,081	771	678
211 èENTRUPERT	0	5,170	3,686	3,555	2,523	543

Table A12.2: Consumption of woody biomass for energy – Summary by County (Obcina)

			Household sector				Energy and Industrial sector		All sectors	Main competing use of the feedstock
		Estimated 2010 population	woodfuel users (primary fuel)	Saturation	Household consumption for heating and cooking	Household consumption for heating and cooking	Consumption by DHS and CHP plants	Wood residues used by wood industries for energy	Total woody biomass used for energy	Woody biomass used by fiber, pulp and tannin industries
	Unit:	Inhabitants	Inhabitants	%	mwh	od t/yr	od t/yr	od t/yr	od t/yr	od t/yr
	Slovenia Total:	**2,046,966**	**615,338**	**30.1**	**2,509,002**	**775,995**	**93,927**	**31,954**	**901,766**	**254,680**
ID	County \ Mapname:	TOT_POP_10	estim.2010 INH_PRWF	Estim. Saturation	hh_conskwh0	hh_conskg0	dhs_chp_kg0	resown_en_kg	we_cons_kg0	pulp_fib_kg0
1	AJDOVè LINA	18,855	8,205	43.5	33,470	10,352	0	103	10,455	0
2	BELTINCI	8,358	2,989	35.8	12,110	3,745	0	19	3,764	0
3	BLED	8,132	1,877	23.1	10,132	3,134	0	0	3,134	0
4	BOHINJ	5,287	2,454	46.4	11,121	3,440	0	0	3,440	0
5	BOROVNICA	3,948	1,991	50.4	12,034	3,722	0	0	3,722	0
6	BOVEC	3,196	1,717	53.7	8,280	2,561	0	0	2,561	0
7	BRDA	5,739	2,606	45.4	9,642	2,982	0	0	2,982	0
8	BREZOVICA	10,807	3,269	30.2	13,796	4,267	0	11	4,278	0
9	BREÄICE	24,327	9,294	38.2	36,144	11,179	0	0	11,179	0
10	TIèINA	4,157	1,714	41.2	6,617	2,047	0	0	2,047	0
11	CELJE	48,783	5,721	11.7	20,868	6,454	2,109	17	8,580	0
12	CERKLJE NA GORENJSKEM	7,011	2,827	40.3	12,452	3,851	0	0	3,851	0
13	CERKNICA	11,180	6,121	54.7	30,581	9,458	0	14	9,472	0
14	CERKNO	4,778	3,296	69.0	14,405	4,455	0	4	4,459	0
15	LRENèOVCI	4,163	1,990	47.8	7,188	2,223	0	2	2,225	0
16	LRNA NA KOROèKEM	3,603	1,303	36.2	6,730	2,082	0	0	2,082	0
17	LRNOMELJ	14,697	8,339	56.7	31,821	9,842	0	89	9,931	0
18	DESTRNIK	2,683	1,458	54.3	5,722	1,770	0	0	1,770	0
19	DIVA LA	3,861	1,812	46.9	9,479	2,932	0	6	2,938	0
20	DOBREPOLJE	3,860	2,717	70.4	11,885	3,676	0	237	3,913	0
21	DOBROVA-POLHOV GRADEC	7,288	2,764	37.9	10,884	3,366	0	57	3,423	0
22	DOL PRI LJUBLJANI	5,342	1,537	28.8	5,606	1,734	0	8	1,742	0
23	DOMÄALE	33,574	5,591	16.7	21,190	6,554	0	43	6,597	20,090
24	DORNAVA	2,954	1,219	41.3	4,616	1,428	0	0	1,428	0
25	DRAVOGRAD	9,063	3,948	43.6	16,456	5,089	0	219	5,308	86,900
26	DUPLEK	6,626	2,414	36.4	9,180	2,839	0	24	2,863	0
27	GORENJA VAS-POLJANE	7,232	4,730	65.4	18,362	5,679	0	616	6,295	0
28	GORIèNICA	3,993	1,240	31.1	3,605	1,115	0	0	1,115	0
29	GORNJA RADGONA	8,621	3,308	38.4	13,332	4,123	0	75	4,198	0
30	GORNJI GRAD	2,674	1,746	65.3	8,280	2,561	2,734	84	5,379	0
31	GORNJI PETROVCI	2,192	1,730	78.9	7,573	2,342	0	40	2,382	0
32	GROSUPLJE	18,966	5,919	31.2	22,261	6,885	0	92	6,977	0
33	èALOVCI	1,591	1,340	84.2	5,396	1,669	0	0	1,669	0
34	HRASTNIK	10,143	2,180	21.5	8,873	2,744	0	0	2,744	0
35	HRPELJE-KOZINA	4,199	2,327	55.4	11,983	3,706	0	0	3,706	0
36	**IDRIJA**	11,889	5,793	48.7	28,860	8,926	1,352	394	10,672	0
37	IG	6,631	2,291	34.5	9,204	2,847	0	44	2,891	0

38	ILIRSKA BISTRICA	13,948	8,229	59.0	41,403	12,805	0	3,738	16,543	98,400
39	IVAN L̈NA GORICA	15,227	8,086	53.1	32,306	9,992	0	719	10,711	0
40	IZOLA	16,000	1,974	12.3	7,181	2,221	0	0	2,221	0
41	JESENICE	21,687	2,762	12.7	13,544	4,189	0	0	4,189	0
42	JURèINCI	2,345	1,432	61.1	4,501	1,392	0	0	1,392	0
43	KAMNIK	28,946	7,997	27.6	32,053	9,913	4,213	60	14,187	0
44	KANAL	5,773	3,432	59.5	14,792	4,575	0	0	4,575	0
45	KIDRI L̈EVO	6,687	2,176	32.5	8,669	2,681	0	0	2,681	0
46	KOBARID	4,199	2,638	62.8	12,871	3,981	0	0	3,981	0
47	KOBILJE	608	426	70.0	1,682	520	0	0	520	0
48	KO L̈EVJE	16,557	8,431	50.9	39,095	12,092	3,437	3,325	18,854	0
49	KOMEN	3,518	1,845	52.4	8,705	2,692	0	0	2,692	0
50	KOPER	52,209	8,225	15.8	33,699	10,423	0	0	10,423	0
51	KOZJE	3,247	2,310	71.2	8,869	2,743	0	4	2,747	0
52	KRANJ	54,782	8,196	15.0	35,403	10,950	0	1,558	12,508	0
53	KRANJSKA GORA	5,291	1,337	25.3	7,137	2,207	0	300	2,507	0
54	KRèKO	25,796	10,013	38.8	36,749	11,366	0	185	11,551	20,090
55	KUNGOTA	4,697	2,016	42.9	7,651	2,366	0	10	2,376	0
56	KUZMA	1,616	968	59.9	3,647	1,128	0	0	1,128	0
57	LAèKO	13,675	6,894	50.4	26,364	8,154	0	285	8,439	0
58	LENART	8,018	2,968	37.0	11,568	3,578	0	24	3,602	0
59	LENDAVA	11,115	4,086	36.8	16,050	4,964	0	0	4,883	0
60	LITIJA	14,741	5,549	37.6	22,405	6,930	0	1,020	7,950	0
61	LJUBLJANA	279,655	15,042	5.4	60,739	18,786	54,900	2,652	76,338	0
62	LJUBNO	2,675	1,854	69.3	9,534	2,949	0	228	3,177	0
63	LJUTOMER	11,833	5,175	43.7	18,844	5,828	0	216	6,044	0
64	LOGATEC	13,109	6,061	46.2	26,347	8,149	0	1,475	9,624	0
65	LOèKA DOLINA	3,953	2,841	71.9	15,722	4,863	0	216	5,079	0
66	LOèKI POTOK	2,003	1,812	90.4	9,632	2,979	0	16	2,995	0
67	LU L̈E	1,565	1,182	75.5	6,422	1,986	250	30	2,266	0
68	LUKOVICA	5,431	2,756	50.7	10,031	3,102	0	0	3,102	0
69	MAJèPERK	4,097	2,230	54.4	8,599	2,660	0	0	2,660	0
70	MARIBOR	112,361	9,090	8.1	36,942	11,426	0	3	11,429	0
71	MEDVODE	15,392	3,523	22.9	14,763	4,566	0	31	4,597	0
72	MENGEè	7,396	1,091	14.8	4,274	1,322	0	0	1,322	0
73	METLIKA	8,439	4,090	48.5	15,400	4,763	0	264	5,027	0
74	MEÄICA	3,683	610	16.6	2,699	835	0	0	835	0
75	MIREN-KOSTANJEVICA	4,841	1,646	34.0	6,704	2,074	0	1,226	3,300	0
76	MISLINJA	4,684	2,829	60.4	11,406	3,528	0	0	3,528	0
77	MORAV L̈E	4,926	2,669	54.2	9,536	2,949	0	20	2,969	0
78	MORAVSKE TOPLICE	6,002	3,740	62.3	14,634	4,526	0	6	4,532	0
79	MOZIRJE	4,073	1,965	48.2	8,663	2,679	477	504	3,660	0
80	MURSKA SOBOTA	19,408	2,851	14.7	11,561	3,576	0	0	3,576	0
81	MUTA	3,519	1,546	43.9	5,963	1,844	0	0	1,844	0
82	NAKLO	5,230	1,402	26.8	6,027	1,864	0	0	1,864	0
83	NAZARJE	2,583	1,337	51.8	5,843	1,807	3,437	240	5,484	0
84	NOVA GORICA	32,089	8,566	26.7	36,759	11,369	0	36	11,405	0
85	NOVO MESTO	35,964	10,284	28.6	33,846	10,468	0	845	11,313	0
86	ODRANCI	1,690	800	47.3	3,363	1,040	0	12	1,052	0
87	ORMOÄ	12,652	5,809	45.9	20,300	6,278	0	80	6,358	0
88	OSILNICA	403	383	95.0	1,735	537	0	0	537	0
89	PESNICA	7,555	3,239	42.9	11,850	3,665	0	0	3,665	0

90	PIRAN	17,734	1,835	10.3	7,259	2,245	0	0	2,245	0
91	PIVKA	5,927	3,792	64.0	19,535	6,042	0	497	6,539	0
92	POD LETRTEK	3,314	2,179	65.7	7,840	2,425	0	0	2,425	0
93	PODVELKA	2,587	1,917	74.1	7,413	2,293	0	701	2,994	0
94	POSTOJNA	15,639	5,209	33.3	26,654	8,244	400	0	8,644	0
95	PREDDVOR	3,448	1,384	40.1	6,460	1,998	1,562	120	3,680	0
96	PTUJ	23,658	3,313	14.0	14,056	4,347	0	0	4,347	0
97	PUCONCI	6,125	3,816	62.3	15,019	4,645	0	0	4,645	0
98	RA LE-FRAM	6,710	2,143	31.9	8,840	2,734	0	52	2,786	0
99	RADE LE	4,475	1,800	40.2	7,625	2,358	0	46	2,404	0
100	RADENCI	5,307	1,709	32.2	7,094	2,194	0	0	2,194	0
101	RADLJE OB DRAVI	6,254	3,308	52.9	13,287	4,110	0	75	4,185	0
102	RADOVLJICA	18,817	4,110	21.8	19,990	6,182	0	0	6,182	0
103	RAVNE NA KOROèKEM	11,708	1,332	11.4	6,362	1,968	0	0	1,968	0
104	RIBNICA	9,351	5,241	56.0	24,771	7,661	0	97	7,758	0
105	ROGAèOVCI	3,229	1,925	59.6	7,276	2,250	0	48	2,298	0
106	ROGAèKA SLATINA	11,110	4,395	39.6	16,547	5,118	0	31	5,149	0
107	ROGATEC	3,165	1,621	51.2	5,547	1,716	0	41	1,757	0
108	RUèE	7,300	1,969	27.0	8,176	2,529	0	7	2,536	0
109	SEMI L	3,781	2,639	69.8	9,808	3,033	0	4	3,037	0
110	SEVNICA	17,645	8,754	49.6	31,933	9,876	1,891	844	12,611	29,200
111	SEÄANA	12,887	4,267	33.1	19,936	6,166	0	0	6,166	0
112	SLOVENJ GRADEC	16,861	5,838	34.6	24,622	7,615	0	160	7,775	0
113	SLOVENSKA BISTRICA	24,733	9,330	37.7	35,172	10,878	0	743	11,621	0
114	SLOVENSKE KONJICE	14,420	5,890	40.8	24,076	7,446	667	577	8,690	0
115	STARèE	4,113	1,623	39.5	6,158	1,904	0	17	1,921	0
116	SVETI JURIJ	2,893	1,815	62.7	5,992	1,853	0	0	1,853	0
117	èEN LUR	8,405	2,237	26.6	9,888	3,058	0	0	3,058	0
118	èENTILJ	8,418	3,283	39.0	12,624	3,904	0	0	3,904	0
119	èENTJERNEJ	6,726	3,529	52.5	11,581	3,582	0	33	3,615	0
120	èENTJUR	18,880	9,363	49.6	34,056	10,533	1,302	305	12,140	0
121	èKOCJAN	3,273	2,188	66.9	7,714	2,386	0	10	2,396	0
122	èKOFJA LOKA	22,694	6,223	27.4	26,315	8,139	0	436	8,575	0
123	èKOFLJICA	8,660	1,958	22.6	7,143	2,209	0	0	2,209	0
124	èMARJE PRI JELèAH	10,052	5,528	55.0	19,808	6,126	0	42	6,168	0
125	èMARTNO OB PAKI	3,164	1,397	44.1	5,828	1,803	0	0	1,803	0
126	èOèTANJ	8,619	2,560	29.7	10,836	3,351	0	0	3,351	0
127	èTORE	4,289	2,170	50.6	9,705	3,001	0	0	3,001	0
128	TOLMIN	11,717	6,278	53.6	30,044	9,292	0	69	9,361	0
129	TRBOVLJE	17,481	2,683	15.4	11,552	3,573	0	0	3,573	0
130	TREBNJE	14,627	6,930	47.4	26,133	8,082	0	0	8,082	0
131	TRÄI L	15,312	4,140	27.0	19,303	5,970	0	0	5,970	0
132	TURNIè LE	3,375	1,674	49.6	6,658	2,059	0	0	2,059	0
133	VELENJE	33,200	2,904	8.7	11,833	3,660	0	74	3,734	0
134	VELIKE LAè LE	4,153	2,473	59.5	11,493	3,555	0	0	3,555	0
135	VIDEM	5,604	2,553	45.6	9,177	2,838	0	0	2,838	0
136	VIPAVA	5,305	2,639	49.7	10,324	3,193	0	8	3,201	0
137	VITANJE	2,286	1,647	72.0	6,485	2,006	0	15	2,021	0
138	VODICE	4,551	1,776	39.0	7,304	2,259	0	20	2,279	0
139	VOJNIK	8,394	3,755	44.7	13,772	4,259	0	1,200	5,459	0
140	VRHNIKA	16,119	4,776	29.6	16,089	4,976	0	167	5,143	0
141	VUZENICA	2,760	1,551	56.2	6,305	1,950	0	0	1,950	0

142	ZAGORJE OB SAVI	17,081	5,524	32.3	22,703	7,022	3,339	0	10,361	0
143	ZAVR╚	1,609	944	58.7	2,927	905	0	0	905	0
144	ZRE╚E	6,489	2,897	44.6	10,070	3,115	0	74	3,189	0
146	ÄELEZNIKI	6,762	3,177	47.0	13,804	4,269	6,841	124	11,234	0
147	ÄIRI	4,917	2,217	45.1	9,707	3,002	0	380	3,382	0
148	BENEDIKT	2,368	1,508	63.7	5,098	1,577	0	0	1,577	0
149	BISTRICA OB SOTLI	1,419	885	62.3	3,217	995	0	0	966	0
150	BLOKE	1,569	1,196	76.2	7,370	2,279	0	0	2,279	0
151	BRASLOV╚E	5,214	2,136	41.0	8,098	2,505	0	0	2,505	0
152	CANKOVA	1,902	1,144	60.2	4,434	1,371	326	40	1,737	0
153	CERKVENJAK	2,051	1,495	72.9	5,226	1,616	0	0	1,616	0
154	DOBJE	962	745	77.4	3,139	971	0	0	971	0
155	DOBRNA	2,193	1,238	56.5	4,307	1,332	0	4	1,336	0
156	DOBROVNIK	1,324	785	59.3	3,509	1,085	0	0	1,085	0
157	DOLENJSKE TOPLICE	3,413	1,847	54.1	8,122	2,512	0	6	2,518	0
158	GRAD	2,254	1,517	67.3	6,320	1,955	0	0	1,955	0
159	HAJDINA	3,766	783	20.8	3,228	998	0	0	998	0
160	HO╚E-SLIVNICA	10,820	2,760	25.5	11,625	3,595	0	239	3,834	0
161	HODOè	315	265	84.3	1,006	311	0	0	311	0
162	HORJUL	2,872	1,337	46.6	5,491	1,698	0	8	1,706	0
163	JEZERSKO	666	409	61.5	2,298	711	0	0	711	0
164	KOMENDA	5,314	1,341	25.2	5,761	1,782	0	700	2,482	0
165	KOSTEL	666	524	78.6	2,709	838	0	0	838	0
166	KRIÄEVCI	3,747	1,759	46.9	6,961	2,153	0	0	2,153	0
167	LOVRENC NA POHORJU	3,127	2,137	68.3	8,552	2,645	0	227	2,872	0
168	MARKOVCI	3,996	1,283	32.1	5,071	1,568	0	0	1,568	0
169	MIKLAVÄ NA DRAVSKEM POLJU	6,290	868	13.8	3,546	1,097	0	0	1,097	0
170	MIRNA PE╚	2,785	1,765	63.4	6,401	1,980	0	0	1,980	0
171	OPLOTNICA	3,949	2,132	54.0	7,875	2,436	0	916	3,352	0
172	PODLEHNIK	1,894	1,216	64.2	4,066	1,258	0	0	1,258	0
173	POLZELA	5,923	2,291	38.7	8,715	2,695	0	28	2,723	0
174	PREBOLD	4,734	1,568	33.1	6,539	2,023	0	0	2,023	0
175	PREVALJE	6,833	1,846	27.0	7,855	2,429	0	0	2,429	0
176	RAZKRIÄJE	1,344	679	50.5	2,850	881	0	0	881	0
177	RIBNICA NA POHORJU	1,253	981	78.3	5,735	1,774	0	320	2,094	0
178	SELNICA OB DRAVI	4,541	2,352	51.8	9,606	2,971	0	45	3,016	0
179	SODRAÄICA	2,167	1,549	71.5	7,621	2,357	0	133	2,490	0
180	SOL╚AVA	515	431	83.8	2,413	746	359	0	1,105	0
181	SVETA ANA	2,369	1,657	69.9	5,876	1,817	0	72	1,889	0
182	SVETI ANDRAÄ V SLOV. GORICAH	1,209	784	64.8	2,663	824	0	0	824	0
183	èEMPETER-VRTOJBA	6,406	623	9.7	2,254	697	0	0	697	0
184	TABOR	1,516	913	60.2	3,216	995	0	0	995	0
185	TRNOVSKA VAS	1,325	877	66.2	3,028	937	0	0	937	0
186	TRZIN	3,776	547	14.5	2,140	662	0	20	682	0
187	VELIKA POLANA	1,460	895	61.3	3,800	1,175	0	14	1,189	0
188	VERÄEJ	1,313	586	44.6	2,107	652	0	0	652	0
189	VRANSKO	2,614	1,449	55.4	5,651	1,748	2,062	0	3,810	0
190	ÄALEC	21,495	5,222	24.3	20,367	6,299	0	37	6,336	0
191	ÄETALE	1,344	1,090	81.1	3,376	1,044	0	0	1,044	0
192	ÄIROVNICA	4,321	748	17.3	3,906	1,208	0	12	1,220	0
193	ÄUÄEMBERK	4,518	3,424	75.8	11,678	3,612	0	9	3,621	0

194	èMARTNO PRI LITIJI	5,390	3,218	59.7	10,672	3,301	0	52	3,353	0
195	APA LE	3,611	1,680	46.5	6,687	2,068	0	105	2,173	0
196	CIRKULANE	2,311	1,232	53.3	4,859	1,503	0	0	1,503	0
197	KOSTANJEVICA NA KRKI	2,421	1,459	60.3	5,057	1,564	0	0	1,564	0
198	MAKOLE	2,102	1,399	66.5	4,978	1,540	0	36	1,576	0
199	MOKRONOG-TREBELNO	2,915	2,011	69.0	7,329	2,267	0	42	2,309	0
200	POLJ LANE	4,572	2,057	45.0	7,843	2,426	0	0	2,426	0
201	REN LE-VOGRSKO	4,296	1,474	34.3	5,651	1,748	0	18	1,766	0
202	SREDIè LE OB DRAVI	2,146	995	46.4	4,135	1,279	0	82	1,361	0
203	STRAÄA	3,795	1,728	45.5	5,814	1,798	2,269	0	4,067	0
204	SV. TROJICA V SLOV. GORICAH	2,130	1,073	50.4	4,056	1,255	0	24	1,279	0
205	SVETI TOMAÄ	2,097	1,485	70.8	5,418	1,676	0	0	1,676	0
206	èMARJEèKE TOPLICE	3,189	1,483	46.5	5,621	1,739	0	12	1,751	0
207	GORJE	2,909	1,066	36.7	5,302	1,640	0	0	1,640	0
208	LOG-DRAGOMER	3,575	620	17.3	2,402	743	0	0	743	0
209	RE LICA OB SAVINJI	2,310	1,511	65.4	5,275	1,631	0	162	1,793	0
210	SVETI JURIJ V SLOV. GORICAH	2,124	1,393	65.6	4,283	1,325	0	48	1,373	0
211	èENTRUPERT	2,812	1,561	55.5	5,547	1,716	0	0	1,716	0

Table A12.3: Balance categories

		Theoretical balance	Legal balance	"legal <30"	"legal <26"	"legal <22"	Actual balance	"actual <30"	"actual <26"	"actual <22"
	Supply component	**Annual increment** of non-timber woody biomass + residues	**Legally accessible** non timber woody biomass + residues				**Recorded actual cut** of non timber woody biomass + residues			
	Cost constraints	(none)	(none)	felling&skidding cost < 30 € /m^3	felling&skidding cost < 26 € /m^3	felling&skidding cost < 22 € /m^3	(none)	felling&skidding cost < 30 € /m^3	felling&skidding cost < 26 € /m^3	felling&skidding cost < 22 € /m^3
	Demand component	current consumption for energy and fiber	current consumption for energy and for fiber industries				current consumption for energy and for fiber industries			
	Maps used in balance calculation	d_e_mai + res_kg - we_cons_kg0 - pulp_fib_kg0	d_e_acut + res_kg - we_cons_kg0 - pulp_fib_kg0	bal_de * cost30msk	bal_de * cost26msk	bal_de * cost22msk	d_e_cut + res_kg - we_cons_kg0 - pulp_fib_kg1	bal_cut * cost30msk	bal_cut * cost26msk	bal_cut * cost22msk
	Unit:	od t/yr	od t/yr	od t/yr	od t/yr	od t/yr	od t/yr	od t/yr	od t/yr	od t/yr
	Slovenia Total:	**2,074,331**	**853,898**	**851,741**	**835,634**	**734,960**	**318,023**	**316,587**	**305,867**	**239,089**
ID	County \ Mapname	bal_mai	bal_de	bal_de30	bal_de26	bal_de22	bal_cut	bal_cut_30	bal_cut_26	bal_cut_22
1	AJDOVè╚INA	29,367	18,494	18,465	18,317	16,579	11,051	11,031	10,932	9,773
2	BELTINCI	1,387	-399	-402	-402	-653	-1,202	-1,204	-1,204	-1,370
3	BLED	6,253	1,699	1,699	1,698	1,677	289	289	289	275
4	BOHINJ	29,154	13,856	13,856	13,850	13,331	9,499	9,498	9,494	9,156
5	BOROVNICA	1,577	-928	-929	-962	-1,179	-1,723	-1,724	-1,746	-1,891
6	BOVEC	26,316	14,511	14,443	14,028	12,777	11,323	11,279	11,003	10,172
7	BRDA	8,129	6,365	6,365	6,309	3,713	4,365	4,365	4,327	2,599
8	BREZOVICA	6,691	1,301	1,301	1,301	1,244	-153	-153	-153	-190
9	BREÄICE	25,924	9,557	9,557	9,481	8,397	4,813	4,813	4,763	4,040
10	TIèINA	734	-149	-149	-149	-159	-603	-603	-603	-609
11	CELJE	3,117	-1,108	-1,108	-1,108	-1,125	-2,964	-2,964	-2,964	-2,975
12	CERKLJE NA GORENJSKEM	5,570	1,601	1,601	1,517	1,457	41	41	-15	-55
13	CERKNICA	25,044	8,353	8,353	8,343	7,842	3,309	3,309	3,303	2,972
14	CERKNO	19,875	12,398	12,398	12,345	11,716	7,239	7,239	7,203	6,785
15	╚RENèOVCI	2,999	888	888	888	822	52	52	52	8
16	╚RNA NA KOROèKEM	17,884	7,807	7,807	7,800	7,673	4,625	4,625	4,620	4,538
17	╚RNOMELJ	66,557	31,444	31,274	29,786	25,738	20,469	20,356	19,366	16,676
18	DESTRNIK	2,337	828	828	828	815	160	160	160	151
19	DIVA╚A	25,754	16,617	16,617	16,449	12,095	10,736	10,736	10,624	7,734
20	DOBREPOLJE	14,939	7,426	7,412	7,351	6,856	4,053	4,043	4,002	3,673
21	DOBROVA-POLHOV GRADEC	18,114	9,197	9,197	9,072	8,307	5,469	5,469	5,387	4,879
22	DOL PRI LJUBLJANI	2,936	1,085	1,085	1,076	1,016	384	384	379	338
23	DOMÄALE	-18,300	-21,030	-21,030	-21,042	-21,184	-22,094	-22,094	-22,102	-22,195
24	DORNAVA	2,236	531	531	531	503	18	18	18	-1
25	DRAVOGRAD	-68,812	-72,392	-72,392	-72,392	-72,397	-74,447	-74,447	-74,447	-74,450
26	DUPLEK	2,970	201	201	196	-53	-565	-565	-568	-734
27	GORENJA VAS-POLJANE	22,030	14,681	14,681	14,665	14,219	9,133	9,133	9,122	8,825
28	GORIèNICA	728	-78	-78	-78	-148	-284	-284	-284	-331
29	GORNJA RADGONA	4,731	2,158	2,158	2,158	2,138	908	908	908	895
30	GORNJI GRAD	9,881	3,549	3,549	3,548	3,473	850	850	850	800

31	GORNJI PETROVCI	6,217	2,367	2,367	2,339	1,805	1,101	1,101	1,082	730
32	GROSUPLJE	10,467	3,375	3,375	3,348	2,457	561	561	543	-48
33	èALOVCI	4,924	2,352	2,352	2,351	2,209	1,266	1,266	1,265	1,172
34	HRASTNIK	4,312	1,320	1,320	1,320	1,298	236	236	236	221
35	HRPELJE-KOZINA	31,034	16,008	16,008	14,003	6,723	10,277	10,277	8,941	4,113
36	**IDRIJA**	**51,658**	**28,183**	**28,164**	**28,059**	**25,973**	**16,952**	**16,939**	**16,869**	**15,480**
37	IG	10,724	4,304	4,304	4,304	4,225	2,470	2,470	2,470	2,418
38	ILIRSKA BISTRICA	8,613	-50,164	-50,191	-51,347	-64,590	-68,827	-68,844	-69,611	-78,405
39	IVAN LNA GORICA	24,824	14,387	14,387	14,338	12,570	7,128	7,128	7,096	5,922
40	IZOLA	-106	-583	-583	-584	-803	-660	-660	-661	-808
41	JESENICE	3,995	263	263	263	261	-984	-984	-984	-984
42	JURèINCI	4,161	2,022	2,022	2,022	2,021	1,117	1,117	1,117	1,117
43	KAMNIK	25,362	9,570	9,570	9,336	8,142	3,366	3,366	3,211	2,420
44	KANAL	27,973	12,948	12,928	12,652	10,787	7,488	7,474	7,290	6,050
45	KIDRI LEVO	1,986	1,058	1,058	1,058	983	29	29	29	-20
46	KOBARID	36,376	21,216	19,986	15,590	12,962	13,829	13,008	10,070	8,318
47	KOBILJE	2,433	1,447	1,447	1,417	1,089	840	840	820	603
48	KO LEVJE	109,705	68,608	68,512	68,307	67,340	45,770	45,707	45,571	44,937
49	KOMEN	6,850	5,240	5,240	5,046	3,606	3,237	3,237	3,109	2,159
50	KOPER	21,402	10,726	10,723	9,752	2,862	6,506	6,503	5,858	1,290
51	KOZJE	13,408	8,617	8,615	8,608	8,504	5,315	5,314	5,309	5,240
52	KRANJ	9,602	1,845	1,845	1,845	1,834	-1,499	-1,499	-1,499	-1,507
53	KRANJSKA GORA	18,524	9,376	9,376	9,376	9,327	6,686	6,686	6,686	6,654
54	KRèKO	17,717	-3,395	-3,398	-3,460	-4,671	-10,541	-10,543	-10,585	-11,391
55	KUNGOTA	3,825	1,819	1,819	1,815	1,756	929	929	927	887
56	KUZMA	1,499	673	673	670	611	163	163	161	122
57	LAèKO	34,370	18,012	18,009	17,979	17,651	10,454	10,452	10,432	10,217
58	LENART	3,178	775	775	775	738	-269	-269	-269	-294
59	LENDAVA	7,451	3,889	3,869	3,836	3,224	1,783	1,769	1,747	1,340
60	LITIJA	36,785	19,049	19,049	19,028	17,851	12,122	12,122	12,108	11,325
61	LJUBLJANA	-41,255	-53,330	-53,330	-53,338	-53,898	-57,809	-57,809	-57,815	-58,186
62	LJUBNO	11,711	4,955	4,955	4,952	4,884	2,589	2,589	2,587	2,543
63	LJUTOMER	5,492	2,845	2,845	2,845	2,832	1,009	1,009	1,009	1,001
64	LOGATEC	23,250	12,377	12,377	12,377	12,351	8,216	8,216	8,216	8,200
65	LOèKA DOLINA	26,443	17,811	17,811	17,811	17,775	10,648	10,648	10,648	10,624
66	LOèKI POTOK	23,089	14,304	14,264	14,259	13,967	8,938	8,912	8,908	8,716
67	LU LE	14,127	7,223	7,223	7,198	6,975	4,343	4,343	4,327	4,182
68	LUKOVICA	9,452	5,215	5,215	5,212	4,961	3,177	3,177	3,175	3,008
69	MAJèPERK	10,658	6,667	6,667	6,667	6,590	3,901	3,901	3,901	3,850
70	MARIBOR	7,997	198	198	196	-118	-2,497	-2,497	-2,498	-2,707
71	MEDVODE	7,532	1,217	1,217	1,211	1,144	-424	-424	-428	-472
72	MENGEè	1,165	135	135	135	118	-278	-278	-278	-289
73	METLIKA	16,287	7,795	7,776	7,369	6,302	4,511	4,498	4,228	3,519
74	MEÄICA	3,336	750	750	747	745	295	295	294	292
75	MIREN-KOSTANJEVICA	5,864	5,273	5,273	5,063	3,186	4,160	4,160	4,021	2,782
76	MISLINJA	11,156	5,938	5,937	5,935	5,711	3,506	3,505	3,504	3,358
77	MORAV LE	9,494	5,220	5,220	5,220	5,073	3,007	3,007	3,007	2,909
78	MORAVSKE TOPLICE	13,614	4,768	4,767	4,765	4,454	2,332	2,332	2,331	2,125
79	MOZIRJE	5,499	2,010	2,010	2,010	2,010	813	813	813	813
80	MURSKA SOBOTA	988	-596	-596	-596	-605	-1,288	-1,288	-1,288	-1,293

81	MUTA	1,705	311	311	311	224	-281	-281	-281	-338
82	NAKLO	2,072	-46	-46	-46	-46	-565	-565	-565	-565
83	NAZARJE	4,796	1,176	1,176	1,175	908	-564	-564	-564	-738
84	NOVA GORICA	37,761	18,906	18,875	18,501	15,094	10,155	10,134	9,887	7,622
85	NOVO MESTO	40,037	24,172	24,151	24,122	22,994	14,896	14,882	14,863	14,121
86	ODRANCI	-592	-661	-661	-661	-662	-681	-681	-681	-681
87	ORMOÄ	10,178	5,445	5,440	5,436	5,370	2,722	2,719	2,716	2,672
88	OSILNICA	4,593	2,348	2,345	2,298	2,262	1,440	1,437	1,406	1,382
89	PESNICA	3,132	1,268	1,268	1,266	1,105	377	377	376	268
90	PIRAN	632	-43	-43	-51	-429	-179	-179	-185	-438
91	PIVKA	30,340	17,034	17,034	17,014	16,132	10,371	10,371	10,358	9,773
92	POD╚ETRTEK	7,472	3,684	3,684	3,679	3,557	2,100	2,100	2,097	2,016
93	PODVELKA	15,613	6,721	6,721	6,721	6,651	3,933	3,933	3,933	3,887
94	POSTOJNA	42,103	17,187	17,187	17,172	16,608	9,499	9,499	9,488	9,119
95	PREDDVOR	7,555	2,742	2,742	2,721	2,366	907	907	894	661
96	PTUJ	2,047	-71	-71	-78	-200	-1,051	-1,051	-1,056	-1,137
97	PUCONCI	6,241	2,319	2,319	2,318	1,942	520	520	519	275
98	RA╚E-FRAM	3,270	705	705	705	298	-141	-141	-141	-411
99	RADE╚E	8,922	4,783	4,782	4,777	4,660	2,613	2,612	2,609	2,532
100	RADENCI	1,054	90	90	90	89	-368	-368	-368	-368
101	RADLJE OB DRAVI	6,386	2,013	2,013	2,011	2,008	275	275	274	272
102	RADOVLJICA	9,413	1,506	1,506	1,506	1,504	-610	-610	-610	-611
103	RAVNE NA KOROèKEM	4,982	2,794	2,794	2,790	2,769	1,418	1,418	1,415	1,401
104	RIBNICA	21,094	12,160	12,160	12,107	12,089	6,668	6,668	6,633	6,621
105	ROGAèOVCI	967	78	78	77	-81	-430	-430	-431	-535
106	ROGAèKA SLATINA	6,383	3,707	3,703	3,701	3,622	1,311	1,308	1,307	1,254
107	ROGATEC	7,622	3,885	3,883	3,879	3,590	2,264	2,262	2,260	2,068
108	RUèE	9,680	4,616	4,616	4,616	4,552	2,318	2,318	2,318	2,276
109	SEMI╚	32,501	22,411	22,411	22,385	22,009	14,326	14,326	14,309	14,060
110	SEVNICA	12,739	-10,483	-10,488	-10,499	-11,200	-19,095	-19,098	-19,105	-19,572
111	SEÄANA	17,787	11,171	11,171	11,029	9,164	6,603	6,603	6,508	5,266
112	SLOVENJ GRADEC	10,918	3,945	3,945	3,943	3,897	610	610	609	579
113	SLOVENSKA BISTRICA	26,859	11,901	11,901	11,893	11,392	5,742	5,742	5,736	5,407
114	SLOVENSKE KONJICE	8,653	4,757	4,757	4,757	4,616	1,830	1,830	1,830	1,737
115	STARèE	836	-394	-394	-395	-488	-806	-806	-807	-867
116	SVETI JURIJ	3,231	1,722	1,722	1,722	1,711	800	800	800	792
117	èEN╚UR	219	-1,129	-1,129	-1,129	-1,129	-1,675	-1,675	-1,675	-1,675
118	èENTILJ	4,924	2,585	2,585	2,580	2,569	922	922	919	912
119	èENTJERNEJ	10,353	5,981	5,969	5,946	5,296	3,553	3,546	3,530	3,099
120	èENTJUR	27,082	13,549	13,548	13,538	13,192	6,545	6,544	6,538	6,309
121	èKOCJAN	5,892	2,376	2,376	2,373	1,909	1,133	1,133	1,131	821
122	èKOFJA LOKA	15,429	7,708	7,708	7,708	7,676	3,699	3,699	3,699	3,678
123	èKOFLJICA	2,898	663	663	657	345	-50	-50	-54	-261
124	èMARJE PRI JELèAH	11,389	5,628	5,628	5,625	5,591	2,590	2,590	2,588	2,565
125	èMARTNO OB PAKI	1,202	159	159	159	159	-400	-400	-400	-400
126	èOèTANJ	11,480	4,683	4,683	4,683	4,680	2,275	2,275	2,275	2,274
127	èTORE	2,515	187	186	184	132	-741	-741	-742	-777
128	TOLMIN	63,591	38,536	38,294	37,111	32,682	23,999	23,838	23,050	20,101
129	TRBOVLJE	5,398	1,828	1,828	1,828	1,799	282	282	282	264
130	TREBNJE	28,849	12,957	12,957	12,936	11,792	7,056	7,056	7,042	6,282

131	TRÄI╚	17,670	6,630	6,627	6,624	6,320	2,815	2,813	2,811	2,615
132	TURNIè╚E	-798	-930	-930	-930	-933	-1,196	-1,196	-1,196	-1,198
133	VELENJE	9,050	4,640	4,640	4,640	4,567	2,342	2,342	2,342	2,294
134	VELIKE LAè╚E	13,651	5,572	5,572	5,567	5,327	3,203	3,203	3,199	3,039
135	VIDEM	7,065	3,382	3,382	3,382	3,314	1,852	1,852	1,851	1,806
136	VIPAVA	14,401	7,905	7,892	7,638	6,449	4,889	4,880	4,711	3,920
137	VITANJE	7,896	3,992	3,992	3,987	3,881	2,137	2,137	2,135	2,066
138	VODICE	532	-817	-817	-817	-818	-1,154	-1,154	-1,154	-1,154
139	VOJNIK	9,732	4,836	4,835	4,835	4,731	2,593	2,593	2,593	2,523
140	VRHNIKA	13,298	7,172	7,172	7,172	7,125	4,825	4,825	4,825	4,793
141	VUZENICA	3,728	1,489	1,489	1,487	1,475	455	455	454	446
142	ZAGORJE OB SAVI	10,351	1,111	1,111	1,101	1,035	-2,110	-2,110	-2,117	-2,158
143	ZAVR╚	1,955	1,048	1,048	1,048	973	621	621	621	571
144	ZRE╚E	9,032	3,822	3,822	3,817	3,689	1,805	1,805	1,802	1,718
146	ÄELEZNIKI	14,623	4,147	4,144	4,139	4,014	-277	-279	-283	-366
147	ÄIRI	3,531	1,275	1,275	1,274	1,202	239	239	239	190
148	BENEDIKT	1,193	196	196	196	193	-253	-253	-253	-255
149	BISTRICA OB SOTLI	5,150	2,387	2,387	2,383	2,149	1,652	1,652	1,649	1,493
150	BLOKE	8,831	3,337	3,337	3,337	3,193	1,892	1,892	1,892	1,799
151	BRASLOV╚E	4,389	2,162	2,162	2,162	2,123	986	986	986	961
152	CANKOVA	731	3	3	0	-103	-386	-386	-388	-456
153	CERKVENJAK	1,285	333	333	333	329	-159	-159	-159	-162
154	DOBJE	1,792	869	869	869	859	378	378	378	372
155	DOBRNA	5,227	2,494	2,494	2,494	2,347	1,450	1,450	1,450	1,352
156	DOBROVNIK	2,417	1,203	1,191	1,182	866	579	571	565	357
157	DOLENJSKE TOPLICE	23,024	17,599	17,599	17,586	17,399	11,220	11,220	11,211	11,089
158	GRAD	1,987	1,190	1,190	1,189	1,081	333	333	332	261
159	HAJDINA	-59	-313	-313	-313	-330	-416	-416	-416	-427
160	HO╚E-SLIVNICA	4,363	1,447	1,447	1,446	1,372	114	114	114	66
161	HODOè	2,030	957	957	957	869	595	595	595	537
162	HORJUL	3,717	1,381	1,381	1,277	1,131	520	520	451	354
163	JEZERSKO	9,571	4,450	4,444	4,430	4,304	2,795	2,791	2,782	2,699
164	KOMENDA	643	-177	-177	-177	-237	-420	-420	-420	-459
165	KOSTEL	10,087	4,337	4,330	4,299	4,087	2,725	2,720	2,699	2,557
166	KRIÄEVCI	1,038	-43	-43	-43	-43	-562	-562	-562	-562
167	LOVRENC NA POHORJU	10,650	4,658	4,658	4,656	4,500	2,328	2,328	2,327	2,225
168	MARKOVCI	-62	-773	-773	-830	-871	-932	-932	-970	-997
169	MIKLAVÄ NA DRAVSKEM POLJU	-18	-550	-550	-550	-583	-685	-685	-685	-706
170	MIRNA PE╚	9,645	5,795	5,795	5,795	5,787	3,439	3,439	3,439	3,433
171	OPLOTNICA	1,794	370	370	370	364	-159	-159	-159	-163
172	PODLEHNIK	7,441	3,998	3,998	3,998	3,969	2,598	2,598	2,598	2,579
173	POLZELA	1,421	519	519	519	507	-378	-378	-378	-386
174	PREBOLD	5,490	3,119	3,119	3,106	3,048	1,537	1,537	1,529	1,490
175	PREVALJE	4,046	1,961	1,961	1,961	1,914	690	690	690	660
176	RAZKRIÄJE	-15	-165	-165	-165	-165	-335	-335	-335	-335
177	RIBNICA NA POHORJU	7,034	1,965	1,965	1,964	1,902	802	802	801	760
178	SELNICA OB DRAVI	8,492	2,762	2,762	2,755	2,561	1,094	1,094	1,090	961
179	SODRAÄICA	7,841	4,167	4,167	4,167	4,127	2,311	2,311	2,311	2,285
180	SOL╚AVA	8,809	3,741	3,738	3,725	3,671	2,373	2,370	2,362	2,326

181	SVETA ANA	2,739	1,201	1,201	1,201	1,194	397	397	397	392
182	SVETI ANDRAÄ V SLOV. GORICAH	1,189	474	474	474	474	149	149	149	149
183	èEMPETER-VRTOJBA	1,290	1,177	1,177	1,177	1,101	747	747	747	696
184	TABOR	5,832	3,307	3,307	3,286	3,176	2,082	2,082	2,068	1,996
185	TRNOVSKA VAS	1,365	397	397	397	380	69	69	69	58
186	TRZIN	314	11	11	11	11	-114	-114	-114	-114
187	VELIKA POLANA	2,474	1,148	1,148	1,134	1,065	581	581	571	525
188	VERÄEJ	29	-39	-39	-39	-42	-194	-194	-194	-196
189	VRANSKO	7,110	3,794	3,794	3,792	3,697	1,421	1,421	1,419	1,357
190	ÄALEC	10,301	6,075	6,074	6,069	5,897	2,725	2,725	2,722	2,607
191	ÄETALE	7,885	4,894	4,894	4,894	4,878	3,123	3,123	3,123	3,113
192	ÄIROVNICA	2,830	1,136	1,136	1,136	1,131	569	569	569	566
193	ÄUÄEMBERK	31,972	19,925	19,925	19,908	19,495	12,701	12,701	12,690	12,415
194	èMARTNO PRI LITIJI	15,147	6,828	6,828	6,810	6,365	3,936	3,936	3,924	3,629
195	APA LE	2,363	964	964	964	963	195	195	195	194
196	CIRKULANE	3,013	1,470	1,470	1,470	1,454	777	777	777	766
197	KOSTANJEVICA NA KRKI	11,363	6,226	6,225	6,190	5,833	3,870	3,869	3,846	3,611
198	MAKOLE	6,112	2,621	2,621	2,621	2,612	1,426	1,426	1,426	1,421
199	MOKRONOG-TREBELNO	17,038	7,390	7,389	7,383	6,554	4,569	4,568	4,565	4,012
200	POLJ LANE	4,794	1,641	1,641	1,638	1,598	477	477	475	448
201	REN LE-VOGRSKO	3,391	2,387	2,387	2,351	1,483	1,276	1,276	1,252	675
202	SREDIè LE OB DRAVI	2,939	1,687	1,687	1,656	1,568	870	870	849	790
203	STRAÄA	1,248	-114	-114	-114	-117	-951	-951	-951	-953
204	SV. TROJICA V SLOV. GORICAH	1,302	411	411	411	408	3	3	3	1
205	SVETI TOMAÄ	3,028	1,240	1,240	1,240	1,146	465	465	465	402
206	èMARJEèKE TOPLICE	2,702	1,313	1,313	1,309	1,186	605	605	602	520
207	GORJE	12,432	5,239	5,239	5,238	5,195	3,168	3,168	3,168	3,140
208	LOG-DRAGOMER	650	106	106	106	41	-118	-118	-118	-162
209	RE ICA OB SAVINJI	3,965	1,897	1,892	1,876	1,837	1,261	1,258	1,248	1,222
210	SVETI JURIJ V SLOV. GORICAH	1,971	869	869	869	865	343	343	343	340
211	èENTRUPERT	8,353	3,454	3,454	3,454	3,377	1,971	1,971	1,971	1,919

Annex 13: Example of woodshed analysis for Idrija with hypotetical biomass plants

Balance considered: **"actual <22"** (Recorded actual cut of non-timber woody biomass with felling&skidding cost < 22 € /m^3 + residues - current consumption for energy and for fiber industries)

Access buffer	Area of buffer zone	Cumulative area	balance within buffer zone (from map bal_cut_22)	cumulative balance	cumulative balance with **10k t** biomass plant	cumulative balance with **20k t** biomass plant	cumulative balance with **40k t** biomass plant
	ha	ha	od kg/year	od kg/year	od kg/year	od kg/year	od kg/year
1	617	617	-2,061,570	-2,061,570	-12,061,570	-22,061,570	-42,061,570
2	470	1,087	31,410	-2,030,160	-12,030,160	-22,030,160	-42,030,160
3	698	1,785	-213,954	-2,244,114	-12,244,114	-22,244,114	-42,244,114
4	1,076	2,861	302,684	-1,941,430	-11,941,430	-21,941,430	-41,941,430
5	1,439	4,300	907,615	-1,033,815	-11,033,815	-21,033,815	-41,033,815
6	1,840	6,140	2,518,900	1,485,085	-8,514,915	-18,514,915	-38,514,915
7	2,171	8,312	1,211,330	2,696,415	-7,303,585	-17,303,585	-37,303,585
8	2,732	11,044	1,168,340	3,864,755	-6,135,245	-16,135,245	-36,135,245
9	3,026	14,070	1,663,080	5,527,835	-4,472,165	-14,472,165	-34,472,165
10	2,979	17,049	-280,707	5,247,128	-4,752,872	-14,752,872	-34,752,872
11	2,933	19,983	1,845,150	7,092,278	-2,907,722	-12,907,722	-32,907,722
12	3,245	23,227	920,018	8,012,296	-1,987,704	-11,987,704	-31,987,704
13	3,594	26,821	1,736,660	9,748,956	-251,044	-10,251,044	-30,251,044
14	3,988	30,809	1,506,390	11,255,346	1,255,346	-8,744,654	-28,744,654
15	4,497	35,306	4,245,460	15,500,806	5,500,806	-4,499,194	-24,499,194
16	4,981	40,287	5,568,500	21,069,306	11,069,306	1,069,306	-18,930,694
17	5,577	45,864	3,542,800	24,612,106	14,612,106	4,612,106	-15,387,894
18	5,233	51,097	2,659,040	27,271,146	17,271,146	7,271,146	-12,728,854
19	4,736	55,833	2,410,010	29,681,156	19,681,156	9,681,156	-10,318,844
20	4,752	60,585	1,463,610	31,144,766	21,144,766	11,144,766	-8,855,234
21	5,144	65,729	1,722,600	32,867,366	22,867,366	12,867,366	-7,132,634
22	5,441	71,170	145,577	33,012,943	23,012,943	13,012,943	-6,987,057
23	5,748	76,918	1,934,460	34,947,403	24,947,403	14,947,403	-5,052,597
24	6,244	83,162	2,724,130	37,671,533	27,671,533	17,671,533	-2,328,467
25	7,082	90,244	3,114,330	40,785,863	30,785,863	20,785,863	785,863
26	7,774	98,018	2,925,080	43,710,943	33,710,943	23,710,943	3,710,943
27	8,143	106,161	2,019,230	45,730,173	35,730,173	25,730,173	5,730,173
…	…	…	…	…	…	…	…
…	…	…	…	…	…	…	…
246	4	2,026,935	1,025	239,190,916	229,190,916	219,190,916	199,190,916