

# Assessment system for the evaluation of potential biomass residues

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AIDIMA, is a non-profit making organization

- ✓ **AIM: research and to transfer innovation** to the Spanish forestry, wood and furniture sector.
- ✓ involved in and coordinated more than 50 European projects (WoodRub, Modelpack, Eforwood, Innobeech, Perspective, etc.)
- ✓ Best4VarioUse project on biomass logistics, plus several projects on bioenergy at a regional and national level (Bioval, Patfor, Biopellets, etc.)



AIDIMA has 740 associated enterprises in Spain.



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## 1. Research topic

- Development of a **integrated biomass supply model** at a regional level for the optimization of the biomass value chain logistics (from forest to plant)
  - maximizing cost efficiency
  - maintaining a sustainable forest management





## 2. Operative objectives

1. **Assessment system for the evaluation of potential biomass residues**
2. **Criteria and indicators for sustainability**
3. **Key points for the improvement (bottle necks)**
4. **Adaptability and applicability of other biomass supply systems**
5. **Integrated harvesting and logistic scenarios**
6. **Alternative solutions for the integration of different forest uses**
7. **Integrated biomass supply management model and good practices**

### 3. On going research

#### 1. Assessment system for the evaluation of potential biomass residues

Different methodologies to obtain biomass stock estimations:

- **direct methods** for local areas where trees can be cut down and measured.
  - **indirect methods** that utilise already calculated biomass coefficients or equations (from direct measures) and data from forest inventories for estimating biomass in larger areas.
  - **innovative technologies** as remote sensing by satellite imagery, LiDAR (*Light Detection and Ranging or Laser Imaging Detection and Ranging*), etc.
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- **At a regional level → indirect methods**  
  
Analyse of biomass stock and harvesting yield in the Valencian Region based on a representative sampling of the different forest types according to the Spanish Forest Inventory (IFN3)

Assessment system for the evaluation of potential biomass residues

Specie	Aboveground biomass (ABW)					Total ABW	Belowground biomass	Total
	Log	Branches			Leaves			
		R >7cm	R 2-7cm	R <2cm				
<i>Pinus halepensis</i>	37,00%	9,80%	8,40%	21,20%	-	76,40%	23,60%	100%
<i>Pinus nigra</i>	51,10%	5,40%	8,00%	15,90%	-	80,40%	19,60%	100%
<i>Pinus pinaster</i>	61,9%	0,9%	4,1%	10,9%	-	77,9%	22,1%	100%
<i>Pinus sylvestris</i>	56,1%	2,5%	7,0%	7,4%	5,6%	78,6%	21,4%	100%
<i>Quercus ilex</i>	18,4%	24,2%	12,2%	8,7%	2,0%	65,4%	34,6%	100%
<i>Quercus faginea</i>	25,1%	24,7%	9,9%	5,5%	3,2%	68,4%	31,6%	100%

**Table 4 – Percentage of dried biomass in Kg from different assortments for some forest species. Source: Own elaboration from Montero et al. (2005).**

## Total potential of forest biomass (stock)

	ABW (Tn)
<i>Pinus halepensis</i>	10.257.019,94
<i>Pinus nigra</i>	1.944.468,32
<i>Pinus pinea</i>	67.373,57
<i>Pinus pinaster</i>	685.827,71
<i>Pinus sylvestris</i>	244.984,63
<i>Quercus faginea</i>	668.374,61
<i>Quercus ilex</i>	341.753,51
<b>Total</b>	<b>14.209.802,29</b>

Table 7 –Forest biomass stock in Valencian Region. Source: Own elaboration.

### Forest biomass residues:

**DBH < 20cm -> complete tree**

**DHB >20cm -> only branches with  $\Phi < 7\text{cm}$**

From which forest residual biomass stock is:

	FBR (Tn)		
	<u>Trees BDH&lt;20cm</u>	<u>Trees BDH&gt;20cm</u>	<u>Trees BDH&lt;7 cm</u>
<u><i>Pinus halepensis</i></u>	2.141.668,97	3.148.756,178	167.280,94
<u><i>Pinus nigra</i></u>	281.372,46	493.939,4708	26.183,06
<u><i>Pinus pinea</i></u>	15.496,50	18.602,07494	13.783,43
<u><i>Pinus pinaster</i></u>	57.978,70	121.174,8581	6.350,86
<u><i>Pinus sylvestris</i></u>	36.372,11	53.082,06535	5.665,69
<u><i>Quercus faginea</i></u>	353.929,21	85.047,36621	21.772,55
<u><i>Quercus ilex</i></u>	160.800,86	63.152,47434	724.087,62
<b>Total</b>	<b>3.047.618,81</b>	<b>3.983.754,49</b>	<b>965.124,15</b>

Table 8 – FBR stock in Valencian Region. Source: Own elaboration.

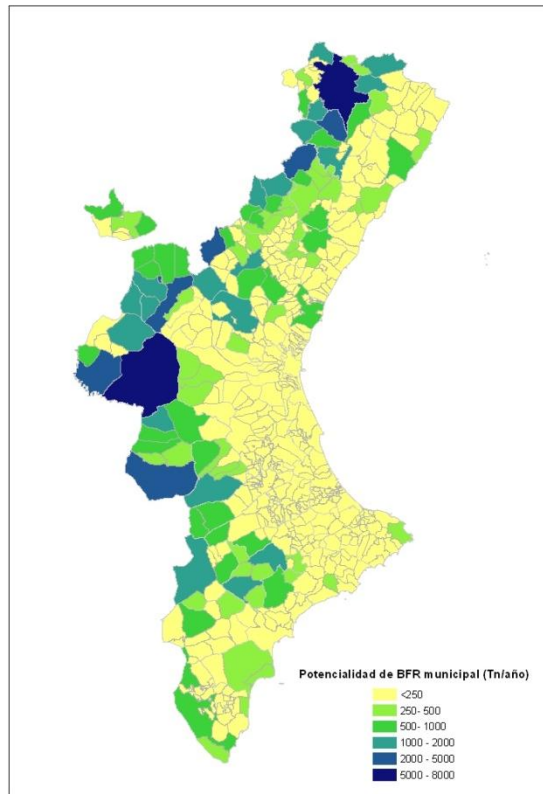
...taking into account the tree growth rate we can calculate the...

## Theoretical potential of forest biomass residues (Potential harvesting yield)

<u>Specie</u>	<u>FBR (Tn/year)</u>			<u>FBR TOTAL (Tn/year)</u>
	<u>Trees BDH&lt;20cm</u>	<u>Trees BDH&gt;20cm</u>	<u>Trees BDH&lt;7cm</u>	
<u><i>Pinus halepensis</i></u>	100.361,43	67.875,43	26.927,17	195.164,02
<u><i>Pinus nigra</i></u>	12.331,23	7.215,92	3.671,10	23.218,24
<u><i>Pinus pinea</i></u>	470,39	391,18	391,18	1.252,76
<u><i>Pinus pinaster</i></u>	3.717,66	1.769,96	1.134,74	6.622,36
<u><i>Pinus sylvestris</i></u>	1.464,80	1.004,18	614,16	3.083,14
<u><i>Quercus faginea</i></u>	1.341,84	5.338,83	868,75	7.549,42
<u><i>Quercus ilex</i></u>	6.695,15	23.294,14	63.583,50	93.572,79
<b><u>Theoretical BRF potential</u></b>				<b>330.462,73</b>

Table 9 – Theoretical potential of FBR split by DBH and specie. Source: Own elaboration

## Estimation of the achievable forest biomass residues



**Restrictions on the BFR use: Protected areas, terrain slope, accessibility etc.**

**Territorial analysis through Geographic Information Systems (GIS) will allow the calculation of these restrictions over the territory**

## 4. First results

### Achievable forest biomass residues

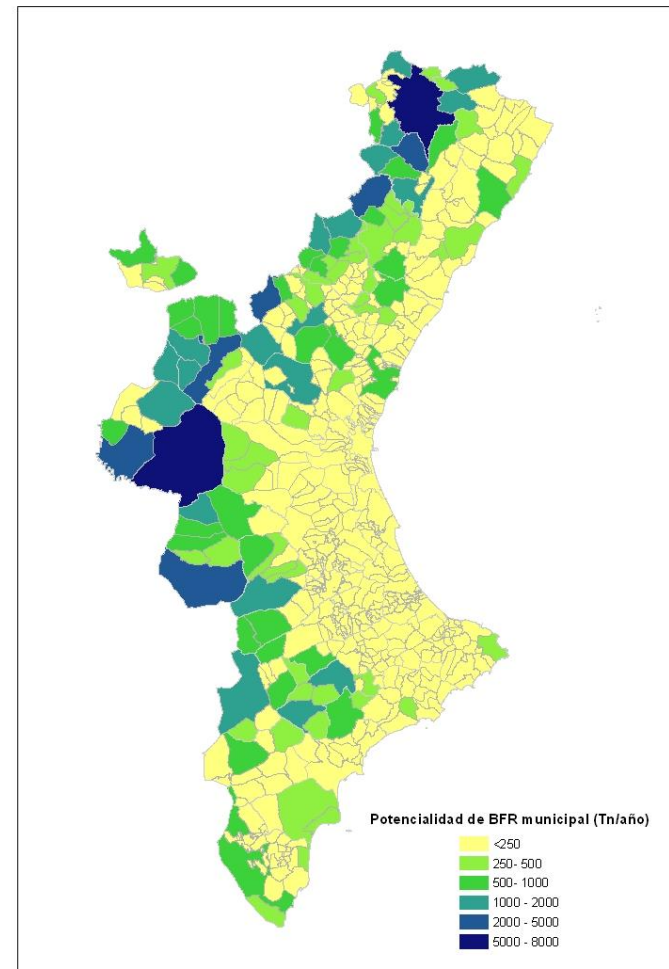
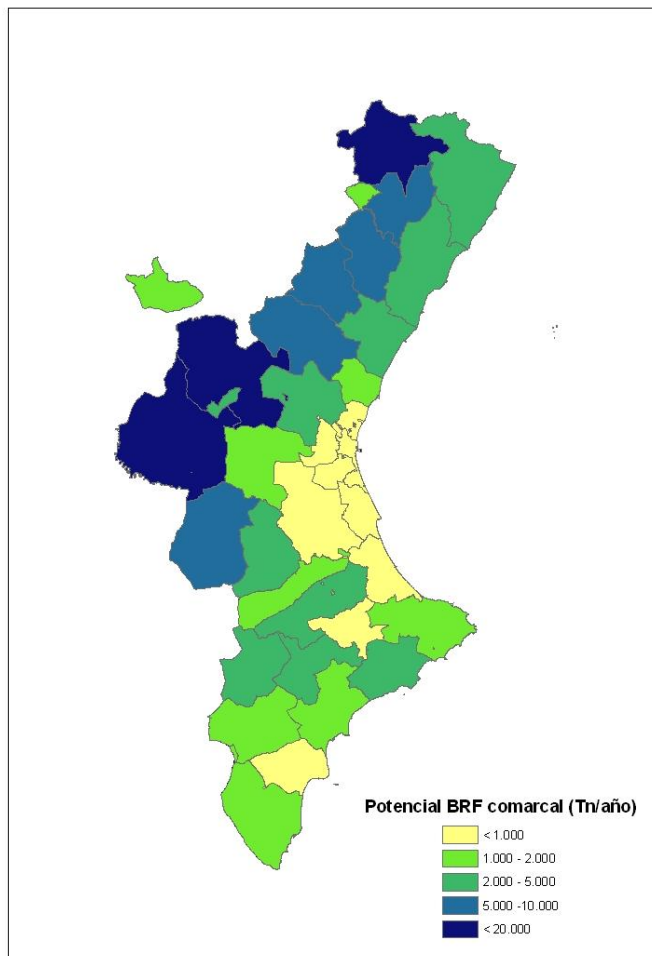
Achievable FBR (Tn/year)	121.855,12
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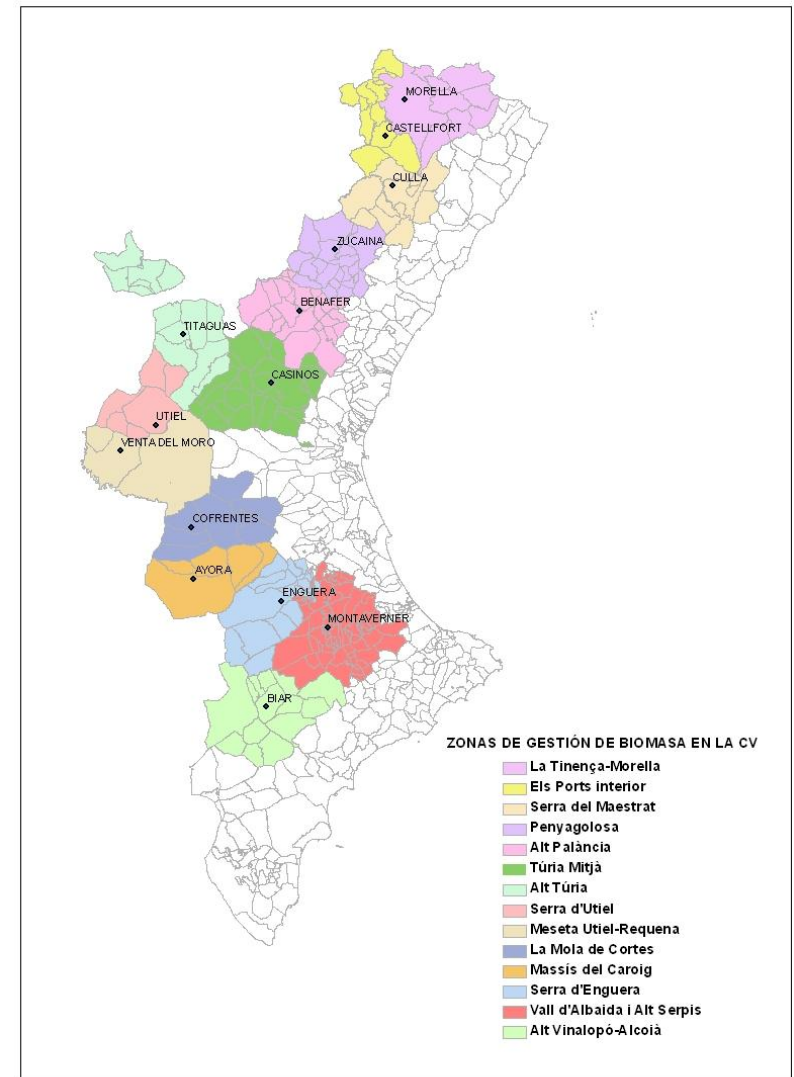
Table 10 – Achievable forest biomass residues in Valencian Region. *Source: Own elaboration*

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## 4. First results



## 4. First results



The background of the slide features a dense pattern of vibrant green leaves, likely from a tree, with visible veins. At the bottom of the image, there are clear, concentric ripples on a body of water, suggesting a natural, outdoor setting. The overall color palette is dominated by various shades of green and blue.

**Thank you!**

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