

Potential and Development of Biomass

(Portugal)

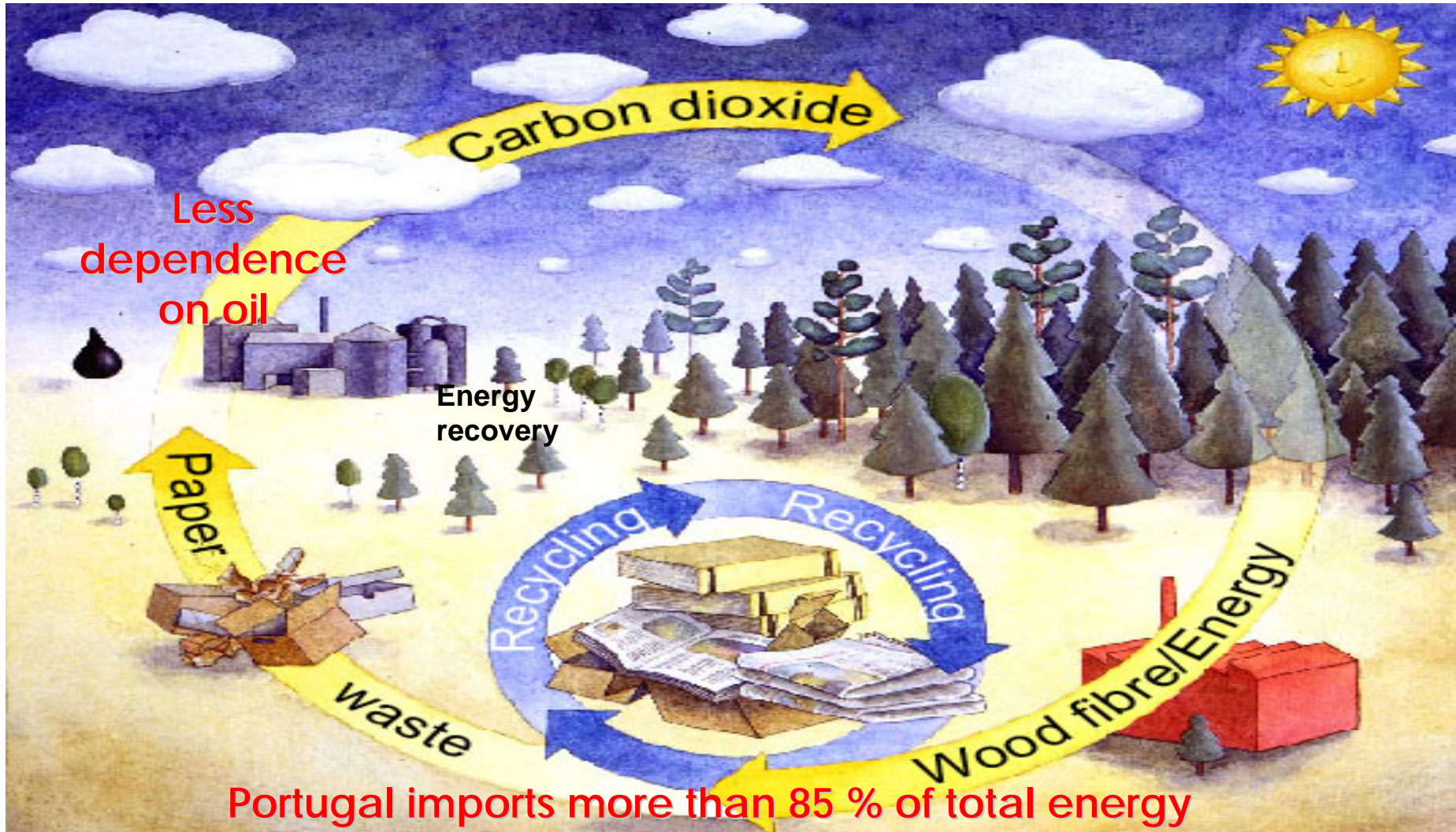
Gil Patrão
(CEO)

EDP Produção - Bioelétrica, S. A.
(Coimbra - Portugal)

Energy Consumption in Portugal

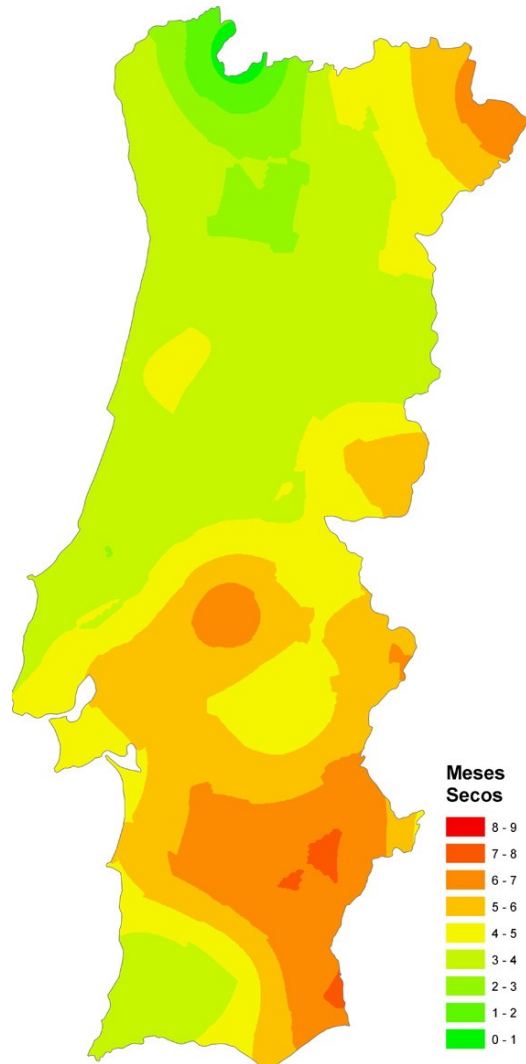
- **Electricity** 18 %
- **Transports** 36 %
- **Heating** 46 %

Biomass, Industry & the Forest Cycle

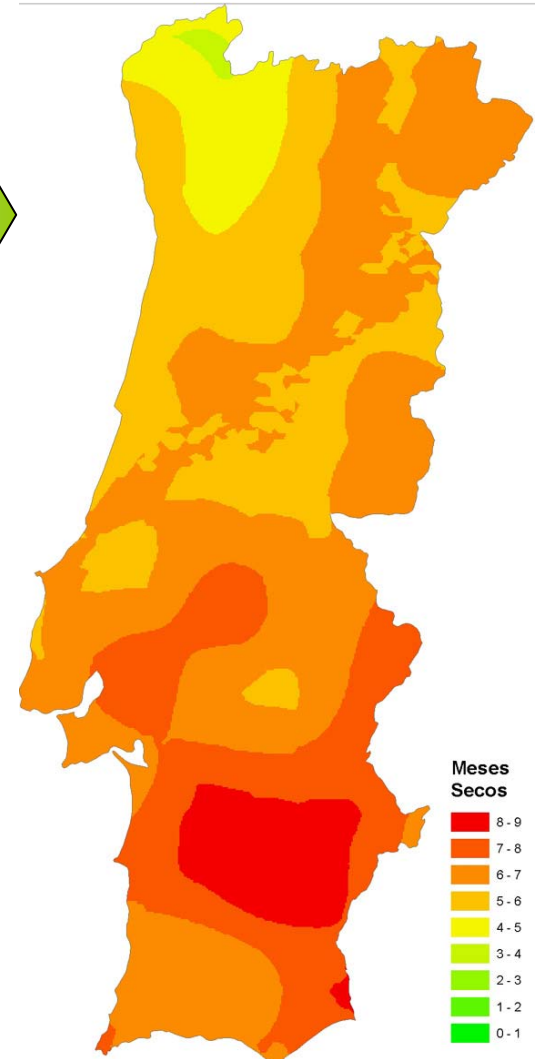


Portugal imports more than 85 % of total energy
more than 60 % is oil

Green House Gase´s Emissions = Global Warming



more dry months
in future

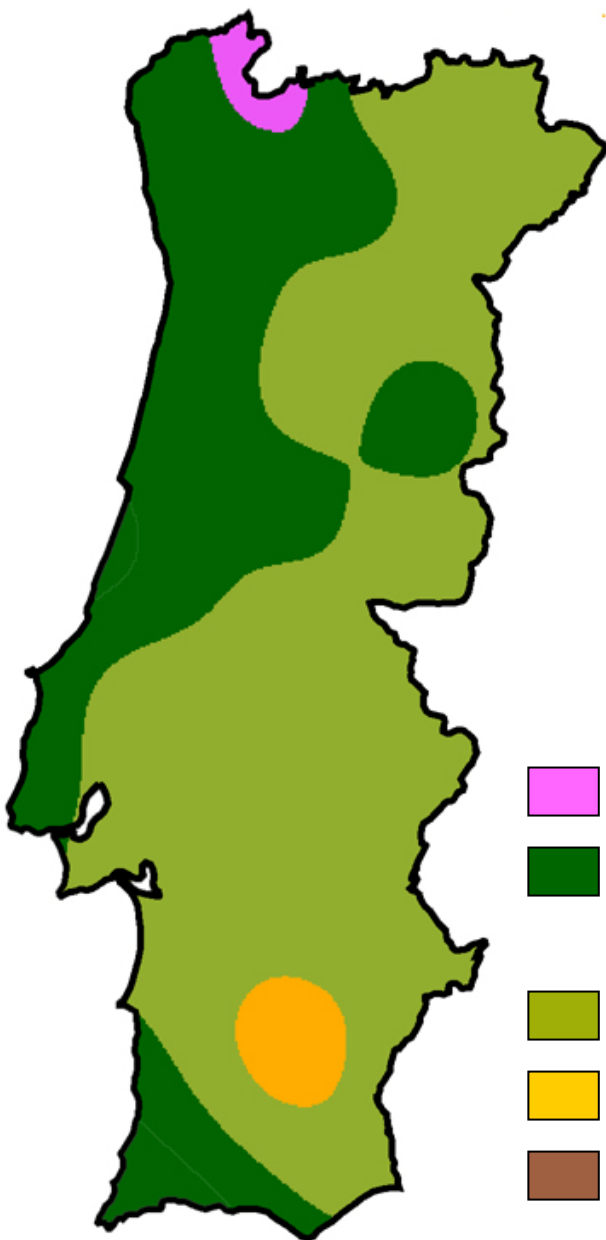







Present

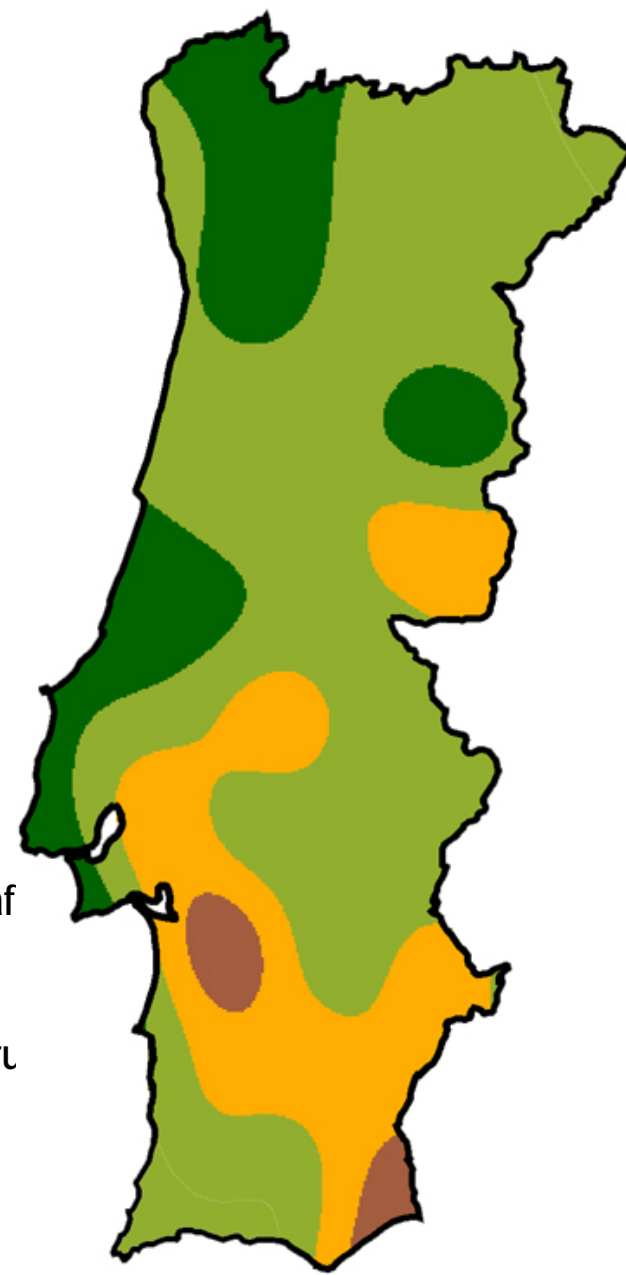
Portugal in Future ?

Future

Future scenario 2XCO₂



-  Temperate deciduous forest
-  Warm-temperate evergreen broadleaf and mixed forest
-  Temp. sclerophyll woodland and shrub
-  Temperate xerophytic shrubland
-  Temperate grassland



POSITIVE ASPECTS for BIOMASS

- Quantified and **ambitious political goals**
- High **sensitivity** from society in favour of renewables (REs)
- **NGO's support** residual forest biomass as fuel
- **Investment Opportunity** . REs in expansion. After wind energy, the Portuguese Government now looks at biomass; allocated power of **250 MWe** fixed by Government Board Resolution 169/2005 (October, 24th)
- Interesting **green tariffs** fixed by Decree Law nº 33-A/2005 (February, 16th):
- **106 €/ MWh for forest residual biomass**
- **100 €/ MWh for animal biomass and landfill gas**

REs in PORTUGAL

The National Electrical Grid (REN) forecasts, for 2010, more than **61 TWh/year** of electric energy consumption in Portugal

(at the growing rate of 5 % per year)

Renewables EU Directive establishes, for Portugal, in 2010, that 39% of electricity consumption comes from REs

(~24 000 GWh)

Portuguese Government National Objective

45 % by 2010

Renewables Energies (REs)

Actual	Technological Plan	2012
	Electric Power (MW)	
4561	Total Hydro	5 800
2780	Wind	5 100
105	Biomass + MSW	400
65	PV	150
-	Waves	30
	Hot Water (Mm ²)	
0.35	Thermal Solar	1

RES ELECTRICITY BALANCE in 2010

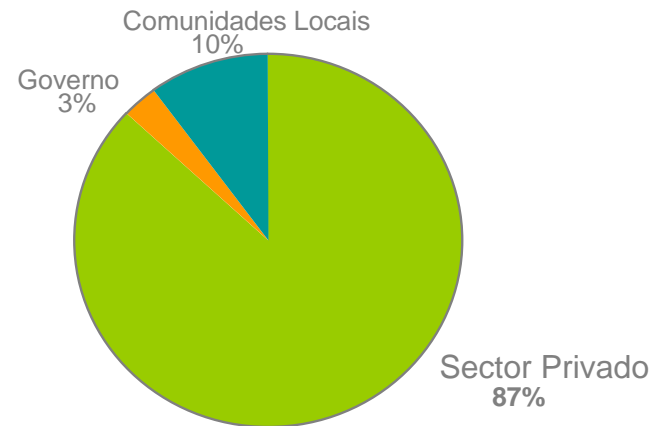
Consumption in 2010 (REN forecast)	61 500 GWh
39 % consumption (commitment)	23 996 GWh
Large HIDROs	12 105 GWh
RE's - 2010-12*	15 251 GWh
Total	<hr/> 27 356 GWh

*Biomass will represent 20 %

Forest occupies 38% of total land (3 349 kha)

Property distribution:

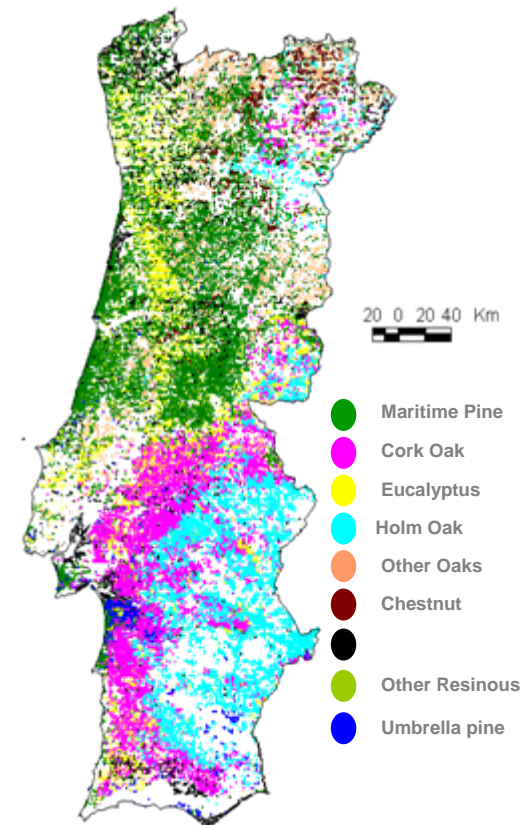
- Privat Owners 87%
- State 3%
- Municipalities 10%



National Forest

Forest Area (more representative dominant species):

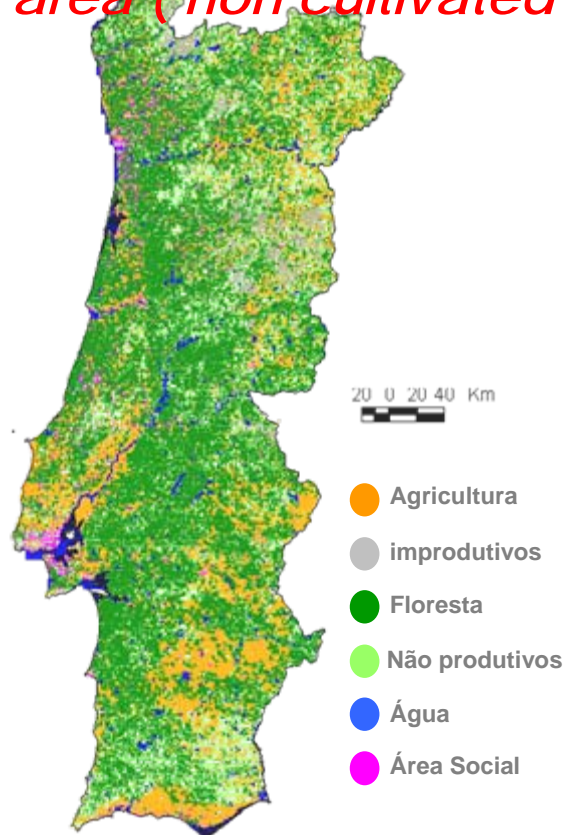
Maritime Pine (<i>Pinus pinaster</i>)	29,1%
Eucalyptus (<i>Eucalyptus</i> spp.)	20,1%
Cork Oak (<i>Quercus suber</i>)	21,3%
Holm Oaks (<i>Quercus rotundifolia</i>)	13,8%



Fonte: CELPA / DGF – 2001 / 2002

Soil Occupation

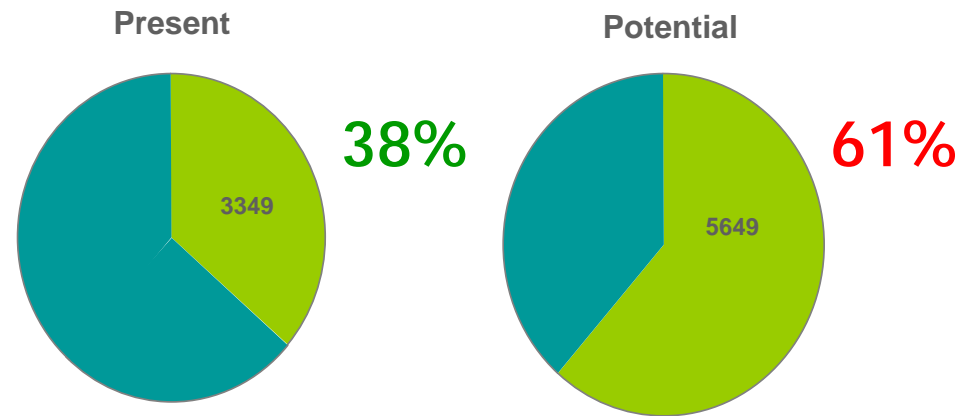
Portugal will increase in the near future by 60 % the forest area (non cultivated land and set aside agricultural land)



Fontee: CELPA / DGF – 2001 / 2002

Forest Area

(units = 1000 ha)



Portugal = 9215

Forest's Role in Portugal ?

Carbon Saving Potential (photosynthesis)*

Pine & Eucalyptus stands - eco-system liquid productivity ~ **600 g C m⁻² y⁻¹**

Carbon Emissions (forest fires)

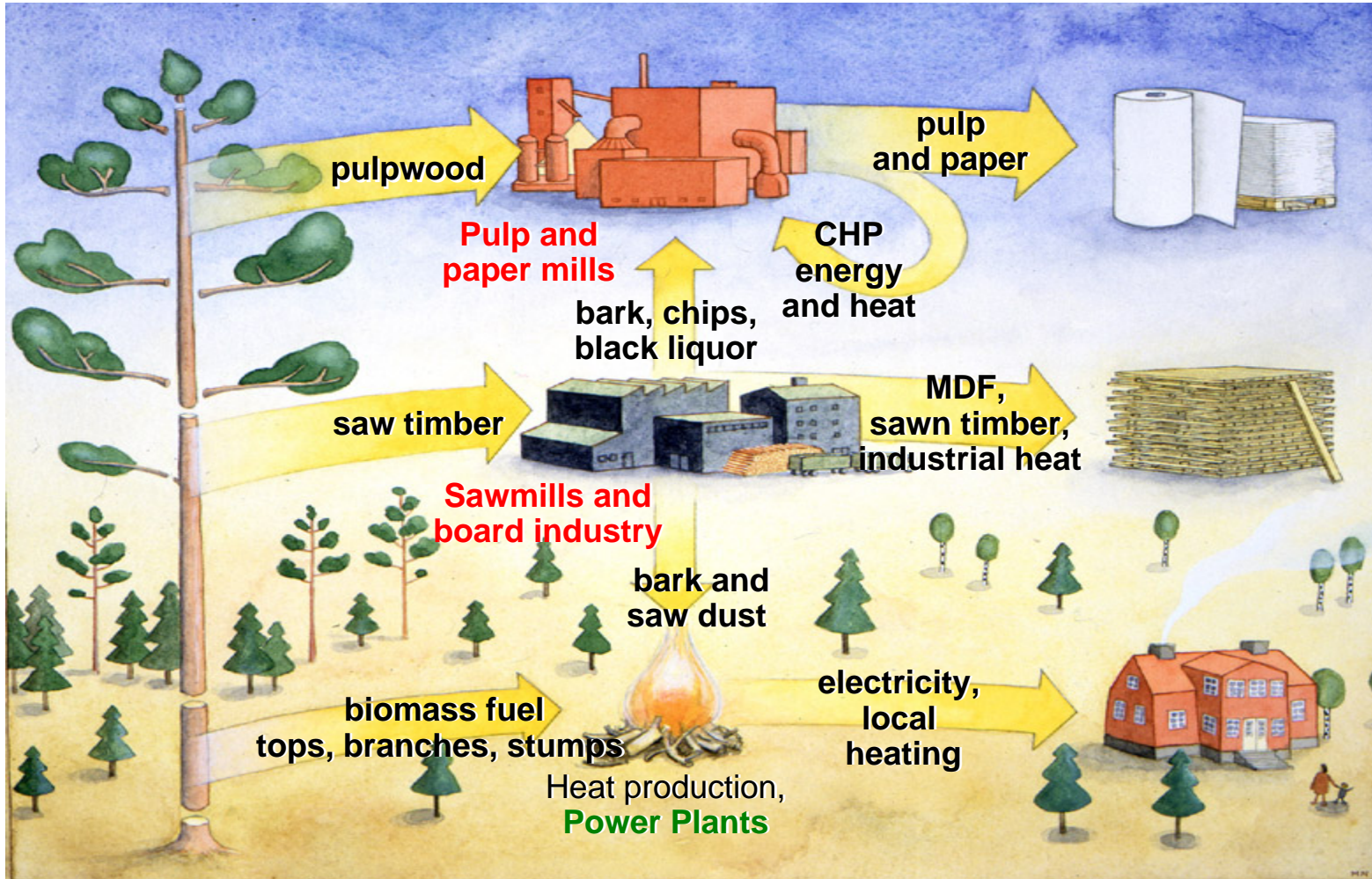
18 % of 2003 global emissions

Low Carbon Fuel (biomass)*

> 3,5 M ton of residual forest biomass /year

* If new trees are planted to replace felled ones

Portugal uses major part of the trees



Source: Adapted from Skogforsk

Eucalyptus and Pine Stands in Portugal

PULP industry annual eucalyptus consumption ...

	$\text{m}^3 \text{sc}^* 10^6$
Pulp	5.32
Board + other uses	0.25
Exporting to Spain	0.9
Total	6.47

28%

$9 \cdot 10^6 \text{ m}^3 \text{cc}$

Source: Celpa

700 000 ha eucalyptus stands ... 200 000 ha without industrial use

BOARD industry & SAWMILLS uses $4 \cdot 10^6 \text{ m}^3 \text{cc}$ of Pine

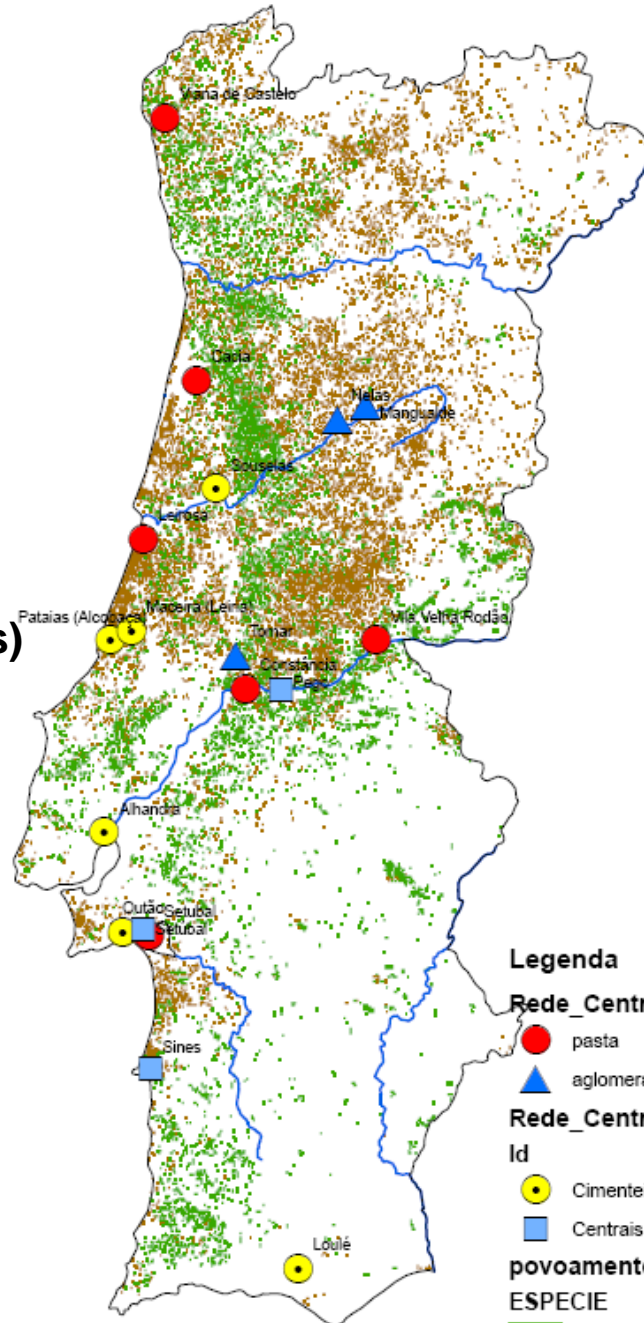
...lots of residual biomass all over the stands....

Rede Centrais Primárias

Primary Power Plants

Pulp & Board
+
Co-firing

(Cement & Energy Industries)



Legenda

Rede_Centrais_Primárias_1

● pasta

▲ aglomerados

Rede_Centrais_Primárias_2

Id

● Cimenteiras

■ Centrais energia

povoamentos florestais ifn

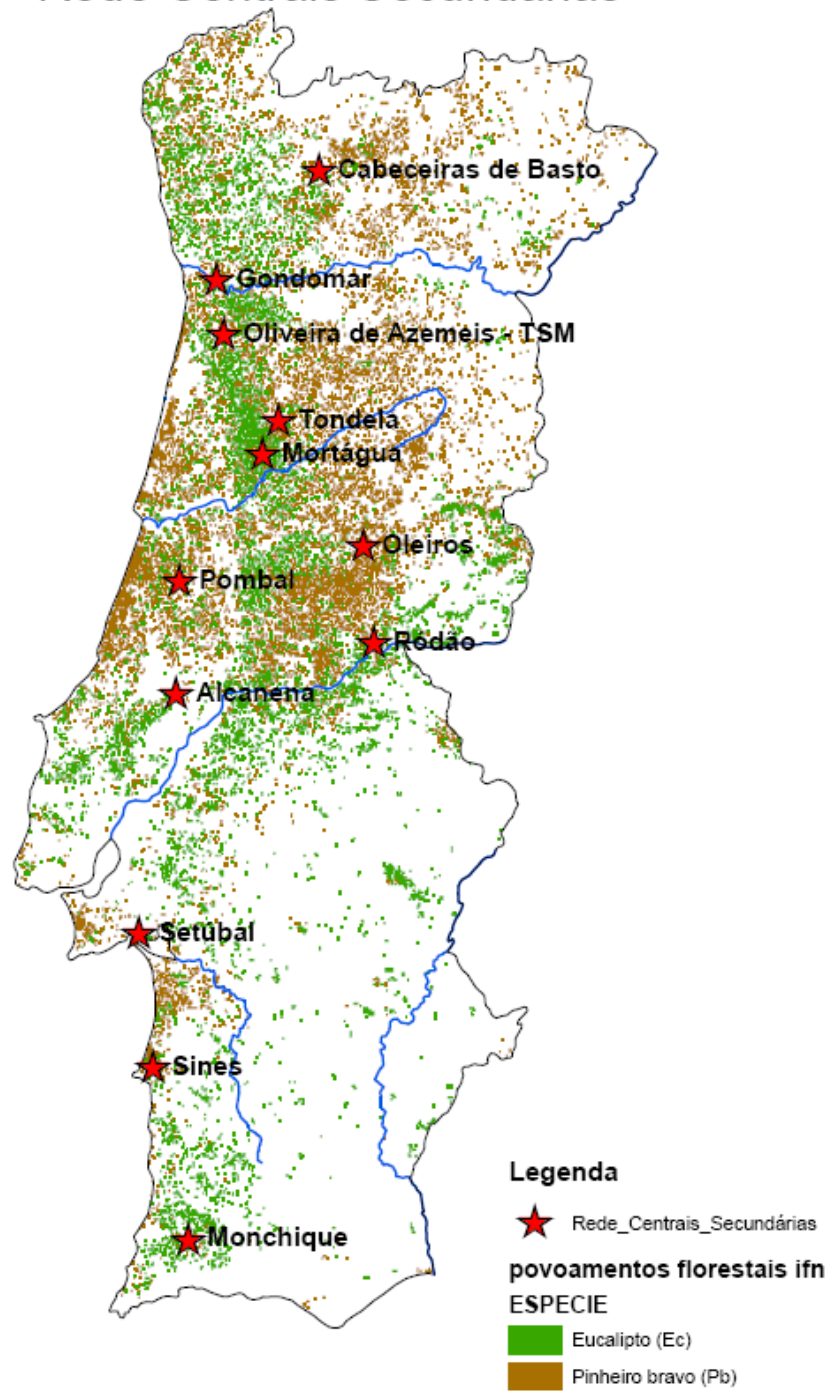
ESPECIE

■ Eucalipto (Ec)

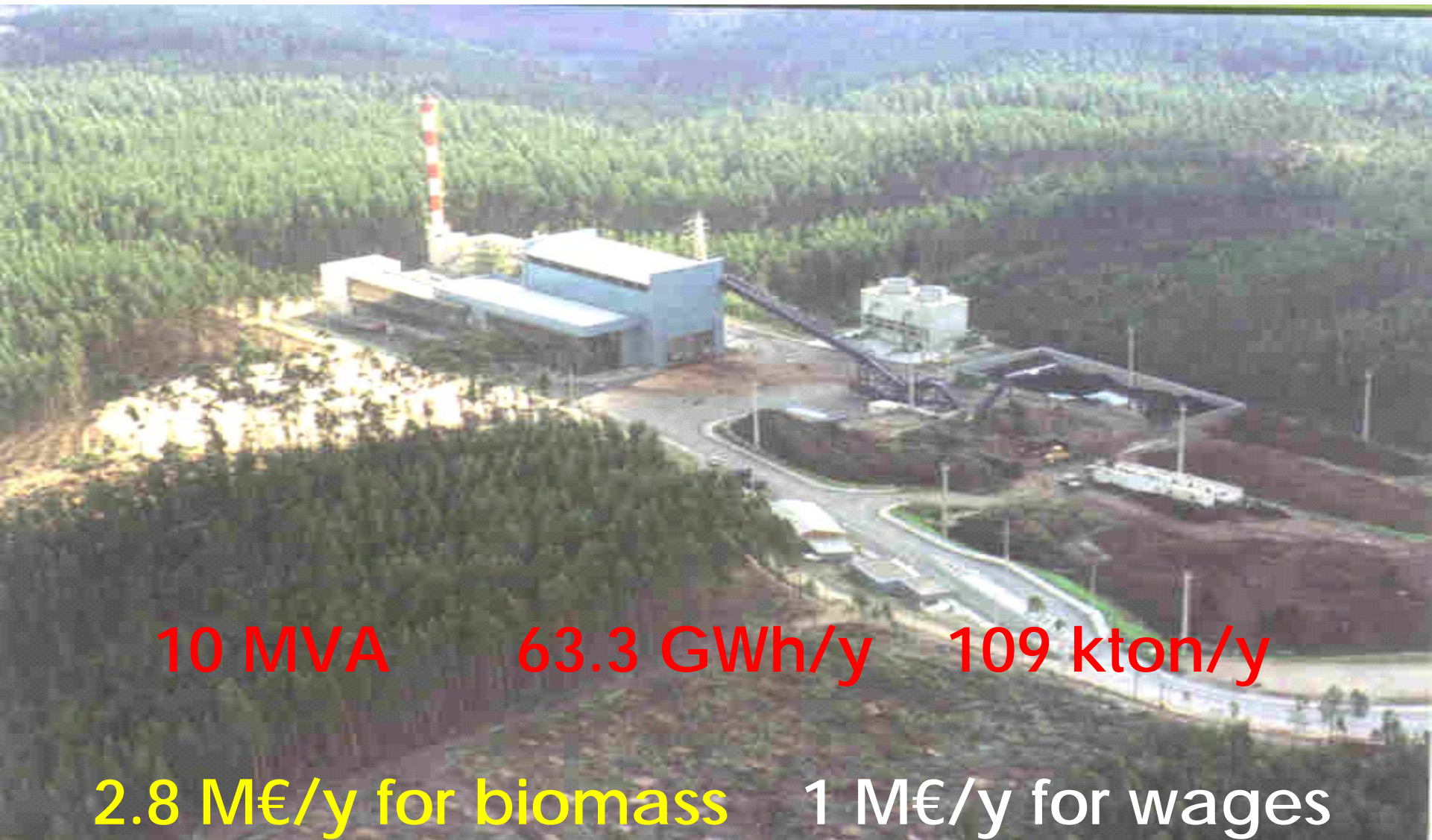
■ Pinheiro bravo (Pb)

Rede Centrais Secundárias

EDP Bioelétrica
actual and
near future
Biomass Power Plants
(120 MWe)



Biomass electricity production



10 MVA

63.3 GWh/y

109 kton/y

2.8 M€/y for biomass

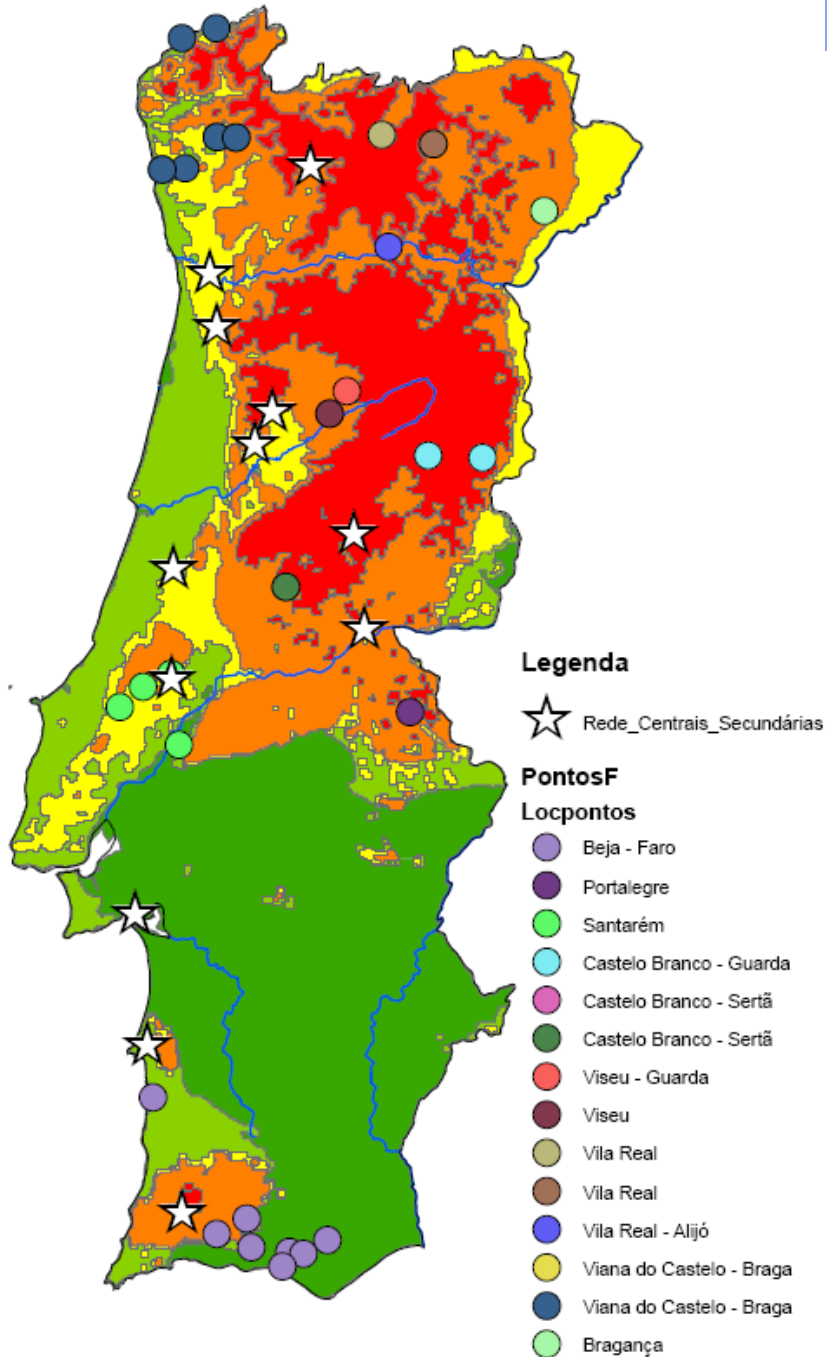
1 M€/y for wages

EDP Bioeléctrica - Mortágua Forest Residues Power Plant

Opportunity for Biomass Valorization



Forest Fire Risk
vs
Bioelétrica Power Plants
&
New Biomass Bids
(250 MWe)



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