



DOMOHEAT Athens Conference: BIOMASS SUPPLY MANAGEMENT SYSTEM - BSMS -

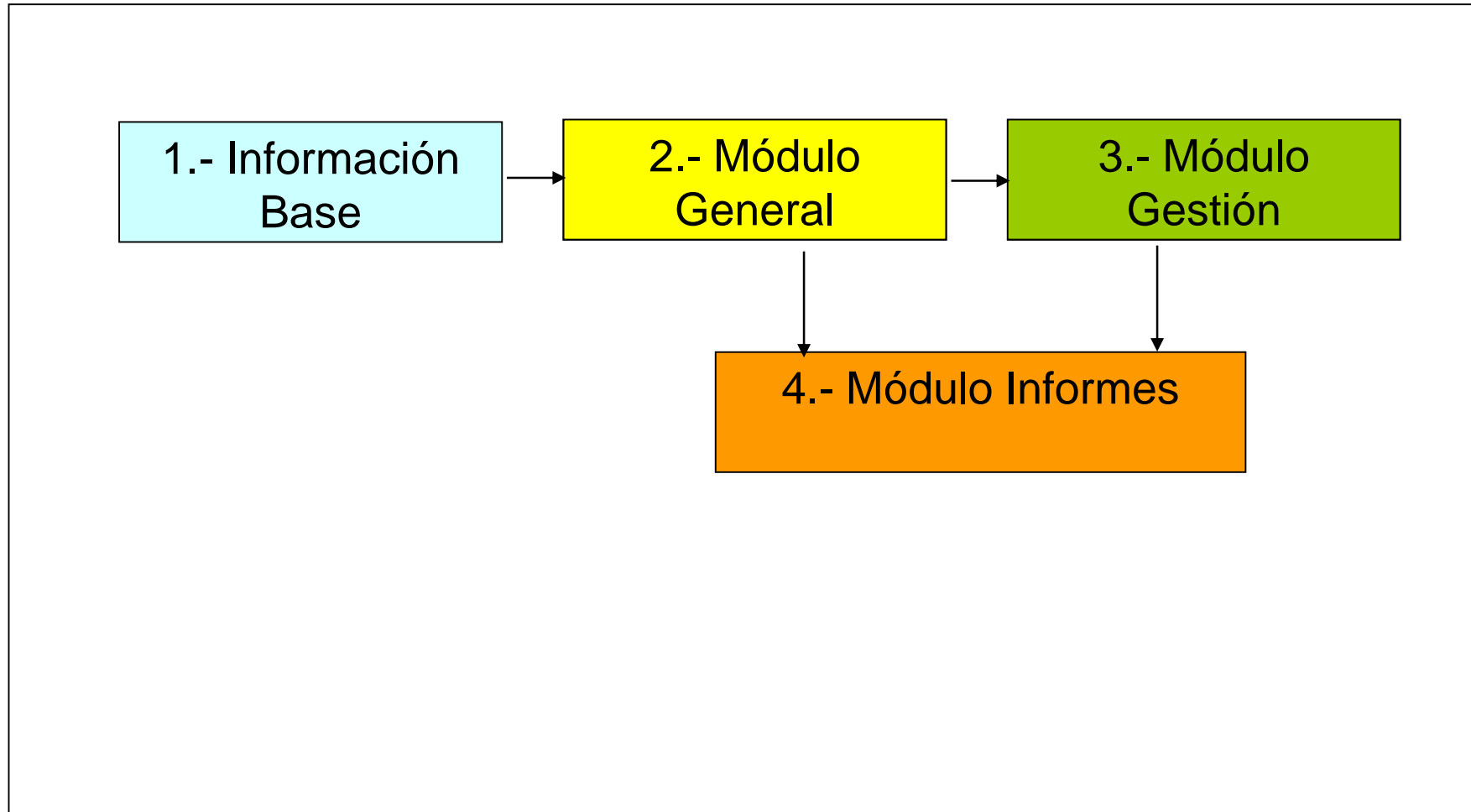
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www.escansa.com/domoheat

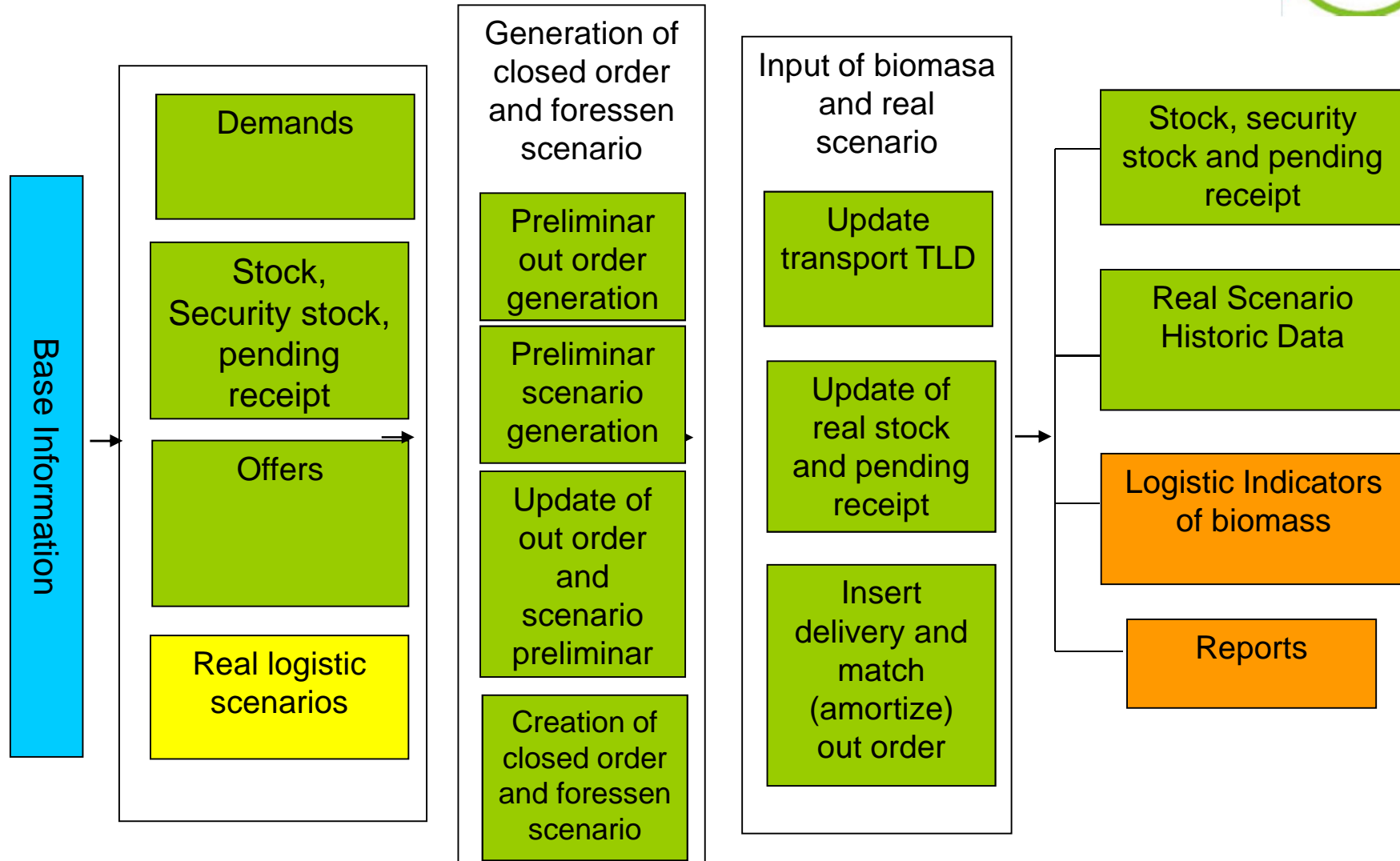




- Overall **goal** to develop and test a *biomass supply system associated to logistic chains*, as a planification tool of different biomass supply options
- For optimizing regional resources.



BSMS Modules



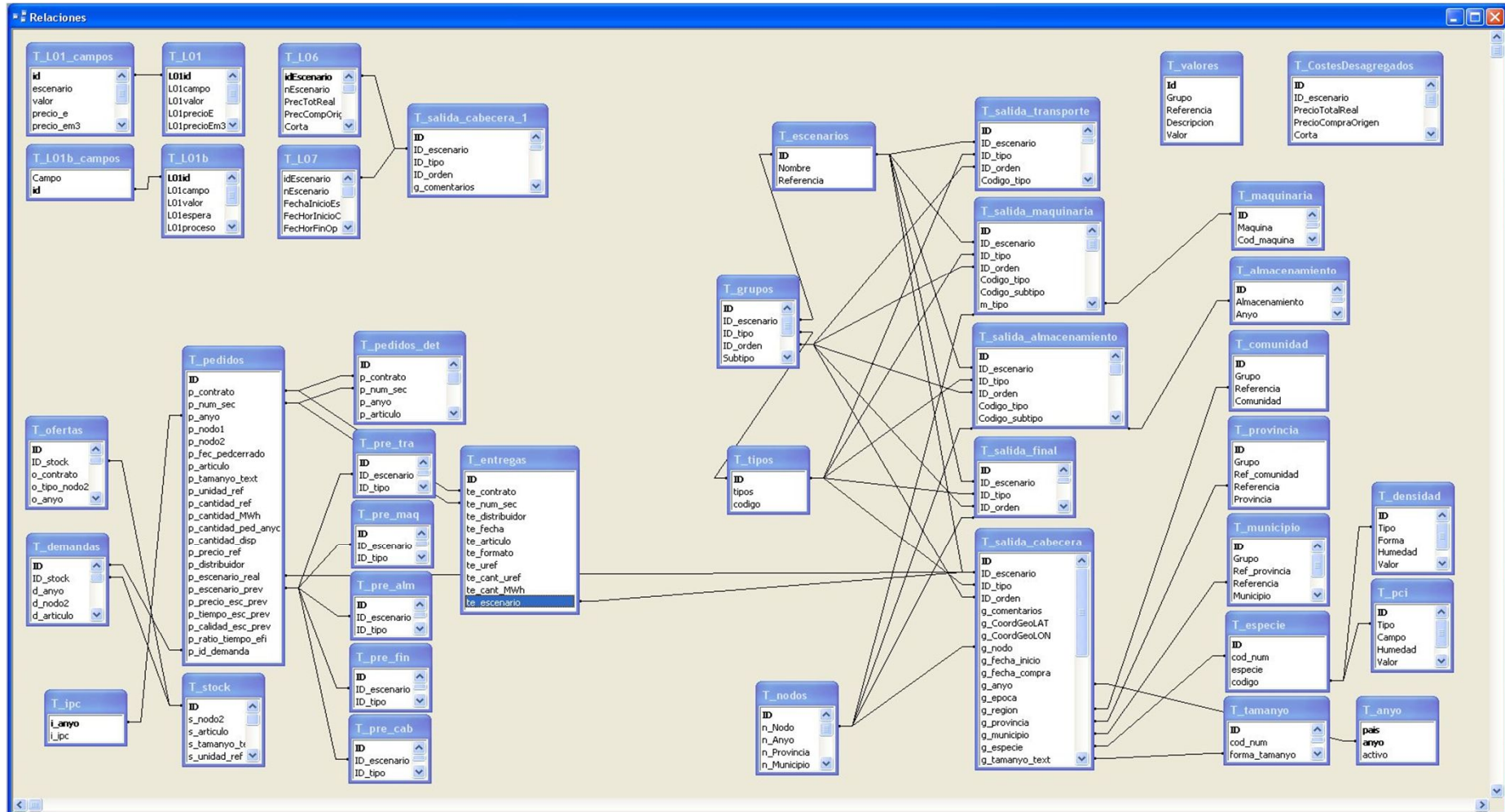


- BSMS is targeted to:
 - *managers of biomass supply,*
 - *regional and local authorities,*
 - *ESCOS,*
 - *installers and engineering firms,*
 - *energy planners public and private energy managers,*
 - *energy advisors,*
 - *and house / buildings owners.*
- BSMS facilitates the decision making through a benchmarking of different indicators: cost, quality, energy balance, productivity and delivered period.



<u>Input data</u>	<u>Output data</u>
<ul style="list-style-type: none"> •Base information. -Geographic. (Region, Province, Municipality and Node). -Biomass (type, shape, size, density, PCI-LHV). -Machinery (technical, economical, energetic). -Storage. •Production Reference scenarios. •Distribution Reference scenarios. •Stock. •Offers. •Demands. •Deliveries 	<ul style="list-style-type: none"> •Preliminary orders. •Preliminary scenarios. •Closed orders. •Envisaged scenarios (predicted). •Real scenarios. •General Reports. •Biomass Logistic Indicators.

BSMS Tables



BSMS Tables

Case study 1 (1)



5.1.- Case study 1. Production and distribution reference scenarios used in Domoheat

- Flow of biomass block by block of different *production reference scenarios*. Each block of information contains technical, economical, energetic data.

Production reference scenarios	Blocks of the production chain
2008.R0041 Pine forest residues chips	Head, Pre-processing, CD transport, Storage, LD transportation, Post-grinding, Final
2008.R0031 Oak forest residues chips	Head, Packaging, CD Transport, Storage, LD Transport, Pre-positurado, Final.
2008.R0091 Poplar energy crops chips	Head, cutting and chipping simultaneous, CD Transport, Storage, LD Transport, Post-crushing, Final

Case study 1 (2)



Disaggregated costs by scenerio and block

L06: Informe de Costes para N escenarios, desagregados por escenario y bloque

Zoom 100%

L06: Informe de Costes desagregados por escenario y bloque

Criterios de selección: S2: 4008

Ordenado por: Escenarios

Escenario	Precio Total Real (€/MWh)	Pr. Compra Origen (€/MWh)	Corta (€/MWh)	Hilerado (€/MWh)	Empac. (€/MWh)	TCD (€/MWh)	Almac. (€/MWh)	TLD (€/MWh)	Pre-Post Triturado (€/MWh)
2008.R0031.Roble_Res.For_Emp+Ast_I	12,06	4,18	0,00	0,00	2,06	0,58	0,10	2,44	2,72
2008.R0041.Pino_Res.For_Ast_Residen	11,06	2,63	0,53	0,00	0,00	1,28	2,08	2,55	1,99
2008.R0091.Chopo_Cult.En_Ast_Reside	25,18	13,63	4,37	0,00	0,00	2,85	0,50	2,39	1,44
Valores medios	16,10	6,81	1,63	0,00	0,69	1,57	0,89	2,46	2,05

Páginas: 1

Case study 1 (3)



Consumed energy versus Produced energy (Energy Balance)

L06e: Informe de Costes para N escenarios, desagregados por escenario y bloque

Zoom 100%

L06e: Informe de Energía consumida para n escenarios, desagregado por escenario y bloque (1 MWh = 3,6 GJ)

Criterios de selección: S2: 4008

Ordenado por: Total GJ consumido

Escenario	Total GJ consumido	Total MWh producido	Ratio GJ/MWh	Corta (GJ)	Hilerado (GJ)	Emp (GJ)	TCD (GJ)	Alm (GJ)	TLD (GJ)	Pre-Post (GJ)	Especie Tipo	Loc. Nodo
156-2008.R0031.Roble_Res.For_	241,9553	778,425	0,3108	0	0	12,6259	3,409	0	27,1308	198,7896	17-Roble	325002
170-2008.R0091.Chopo_Cult.En_	417,1786	1943,8	0,2146	34,0319	0	0	42,0237	0	72,035	269,088	11-Populus	455001
159-2008.R0041.Pino_Res.For_A	10106,1388	41813	0,2417	227,7867	0	0	406,7619	0	2008,2416	7463,3486	13-Pinus	285001
Totales	10765,2727	44535,225		261,8186	0	12,6259	452,1946	0	2107,4074	7931,2262		
Valores Medios	3588,424233	14845,075		87,2728666	0	4,20863333	150,731533	0	702,469133	2643,74206		

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Case study 1 (4)



Quality ratio of scenarios

L03: Informe sobre Calidad en varios escenarios

Criterios de selección: S2: 4008

Ordenado por: Escenarios

Escenario	Calidad en origen			Calidad en producto final							
	Forma - Tamaño	PCI (MWh/t)	Hum. (%bh)	Prod (tm)	Prod. (MWh)	Ratio Calidad	Forma - Tamaño	Hum. (%bh)	Cenizas	PCI (MWh/t)	Granulad Comp. Qui
2008.R0031.Roble_Res.For_Emp+Ast	17-PC4-D=80cm,L=250cm	3,11	0,30	250	778	100,1	17-AS1-5cm	0,30	0,54	3,11	0,00
2008.R0041.Pino_Res.For_Ast_Reside	13-AS1-5cm	4,18	0,20	10.000	41.813	100,1	13-AS1-5cm	0,20	0,20	4,18	0,00
2008.R0091.Chopo_Cult.En_Ast_Resi	11-AS1-5cm	3,89	0,20	500	1.944	52,45	11-AS1-5cm	0,20	5,60	3,89	50,00
Nº de escenarios: 3			Producción Total		10.750	44.535					
			Valores Medios		3.583	14.845	98,02	0,20		4,14	

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Case study 2 (1)



- 5.2 Case study 2. Generation of supply orders and selection of most appropriate options (year 2009) .Main results.

- 3 End users:

C1 –Location León (NODE-245909), 100 kW power

C2 – Location Vigo (NODE-365902), 60 kW power

C3 – Location Madrid (NODE-285910), 300 kW power

- Multifuels:

Pine pellets (article 31, PE1=d 0,6 cm, L= 3cm)

Oak pellets (article 32, PE1=d 0,6 cm, L=3 cm)

Pine chip + bark (article 41, AS1 - 5 cm)

Hazelnut shell (article 44, AS3 – 1,25 cm)

Olive kernell (article 45, grain GR3-2-4 mm)

Case study 2 (3)



Generación de pedidos y escenarios preliminares

Años de demandas	Escenarios preliminares generados (Nº contr + Id esc + año + nodo1)			Ofertas libres						
				contrato	año	nodo1	nodo2	artículo	cantidad	disp_ref
2009	10	238	2008 18500:	7	2009	325001		33-Pino (corteza)	10000	10000
	9	235	2008 43500:							
	8	231	2008 40500:							
	6	225	2008 15500:							
	5	222	2008 15500:							
	12	241	2008 45500:							
	10	240	2008 18500:							

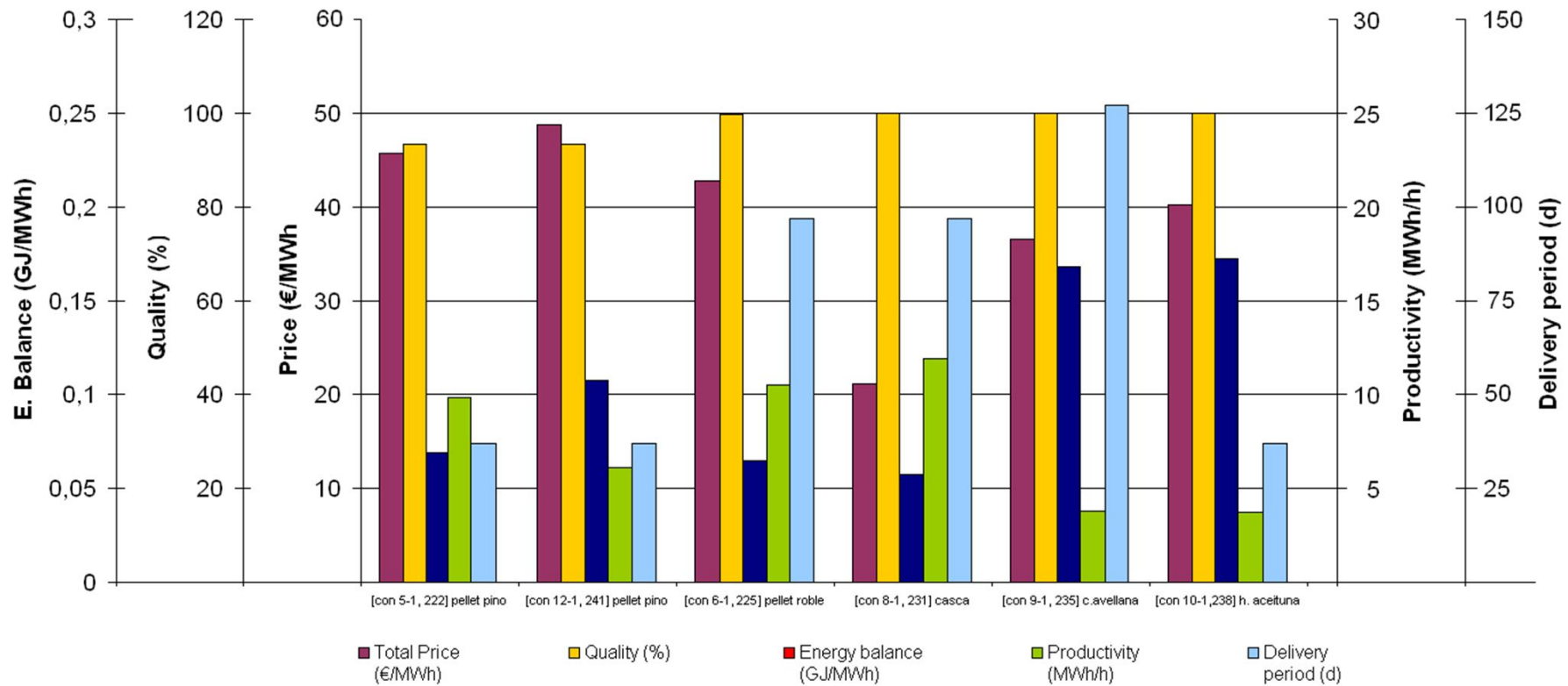
Listado de cantidades asignadas a contratos

contrato	secuencia	artículo	nodo1	nodo2	escenario	precio total emwh	cantidad a pedir	cantidad disp	cantidad asignada
5	3	31-Pino (serrín)	155001	365902	223	41,5169245084902	0	29859	21
12	2	31-Pino (serrín)	455001	285910	245	43,4069394441128	0	9740,7	91
5	1	31-Pino (serrín)	155001	245909	222	45,7272114763545	0	29859	29
12	1	31-Pino (serrín)	455001	245909	241	48,8029860797238	0	9740,7	29
5	2	31-Pino (serrín)	155001	285910	224	51,5305521428879	0	29859	91
12	3	31-Pino (serrín)	455001	365902	244	53,5549175353983	0	9740,7	21
6	3	32-Roble (serrín)	155001	365902	226	38,8445693911469	0	29856	19
6	1	32-Roble (serrín)	155001	245909	225	42,799823488767	0	29856	31
6	2	32-Roble (serrín)	155001	285910	227	48,251634048567	0	29856	94
8	2	41-Piña (casca)	405001	285910	233	19,0088865708687	0	857	93
8	1	41-Piña (casca)	405001	245909	231	21,1522846548063	0	857	31
8	3	41-Piña (casca)	405001	365902	232	23,9935935260128	0	857	19
9	2	44-Avellana(cáscara)	435001	285910	237	32,6763698656485	0	3841	103
9	1	44-Avellana(cáscara)	435001	245909	235	36,5876767185528	0	3841	35
9	3	44-Avellana(cáscara)	435001	365902	236	42,724754874491	0	3841	21
10	2	45-Hueso aceituna	185001	285910	240	33,6556674628985	0	1044	101
10	1	45-Hueso aceituna	185001	245909	238	40,2750663649015	0	1044	34
10	3	45-Hueso aceituna	185001	365902	239	45,10485579177	0	1044	21

Núm. contrato Secuencia Cantidad asignada Reasignada **Reasignar cantidades**

Generar pedidos, escenarios y asignar cantidades **Cerrar Pedidos** **Cerrar**

Case study 2 (4)





- 5.3 Conclusions strengths points and future work.
- The objective of the present work was to develop and test a program for biomass supply associated to logistic chains, as a planning tool of different biomass supply options, for optimizing regional resources.

Conclusions



- We compile data: geographic, biomass characteristics, machinery, logistic process from Domoheat results, from producers and distributors of biomass.
- We developed flexible scenarios for production and distribution of biomass, biomass logistic indicators, and generation of out orders associated to logistic chains.
- We calculated: disaggregated total costs ($\text{€} \cdot \text{MWh}^{-1}$), quality of biomass (%), energy balances ($\text{GJ} \cdot \text{MWh}^{-1}$), productivities ($\text{MWh} \cdot \text{h}^{-1}$) and delivered period (days).
- We generated supply orders associated to logistic chains for 3 Domoheat multifuel heating plants located in Vigo, León and Madrid using pellets (pines, oak), chips and shells (pinecone, hazelnut) and grains (olive kernel).
- The analysis of results based on the indicators allowed to select the most appropriated order for each energy plant, optimizing regional resources.

Conclusions



- BSMS software provides a *planning tool for biomass supply* at regional level
- The model considers *biomass reference scenarios* for production and distribution dependent of regional conditions (geographic, biomass characteristics, machineries, logistic processes)
- The *out order* for biomass supply to energy plant is calculated based on the offer, demand and reference scenario.
- The program presents *biomass logistic indicators*: delivered cost, delivered quality, energy balance, productivity, delivered period.
- Further work will be: to implement the model in different regions, and benchmarking of regional results; to provide liberated emissions due to production and distribution of biomass; and to calculate the costs for establishing and running the energy plant.



Thank you
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