CREFF
Cost Reduction and Efficiency Improvement of Short Rotation Coppice
(2008-2012)

CREFF
Cost Reduction and Efficiency Improvement of Short Rotation Coppice

What and why?

Present geopolitical and environmental world context:

- Rarefaction of fossil fuels
- Needs to reduce CO_2 emissions

➔ **Promotion of renewable energy**

➔ **Biomass**

➔ **Short Rotation Coppice (SRC)**

What and why?

Up to recently, slow development in Europe due to non competitive profits as compared to non-energetic cultures

- Expensive plant material
- Plant breeding and optimization of species-site matching needed
- High harvest and transport costs

➔ **Necessity to reduce production and supply costs**

What and why?

- At present, research results available for: - medium to good sites
  - for large field sizes

- Such conditions rarely found in many regions of Central Europe:

- **Good sites** rare and expensive and used for demanding annual crops

  ➔ SRC on less favorable sites in terms of soil quality and forms

- Average **sizes of fields and farms** much smaller than in UK and south-Sweden

  ➔ SRC in small field sizes, at scattered locations and on unfavorable sites

What and why?

- At present, research results available for: - medium to good sites
  - for large field sizes

- Such conditions rarely found in many regions of Central Europe:

- **Good sites** rare and expensive and used for demanding annual crops

  ➔ SRC on less favorable sites in terms of soil quality and forms

- Average **sizes of fields and farms** much smaller than in UK and south-Sweden

  ➔ SRC in small field sizes, at scattered locations and on unfavorable sites

➔ To promote the use of biomass from SRC, **optimized SRC value chains for unfavorable conditions have to be found**

What and why?

Short Rotation Coppice call 2008

1- Genetic improvement (➔ BREDNet-SRC)

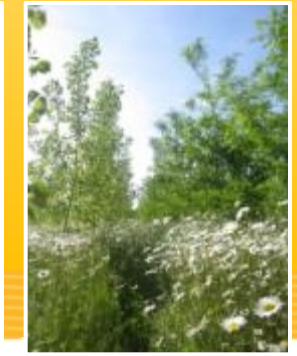
2- Value-chain optimization (➔ CREFF)

3- Environmental issues (➔ RATING-SRC)

- French-German project funded by ADEME and FNR

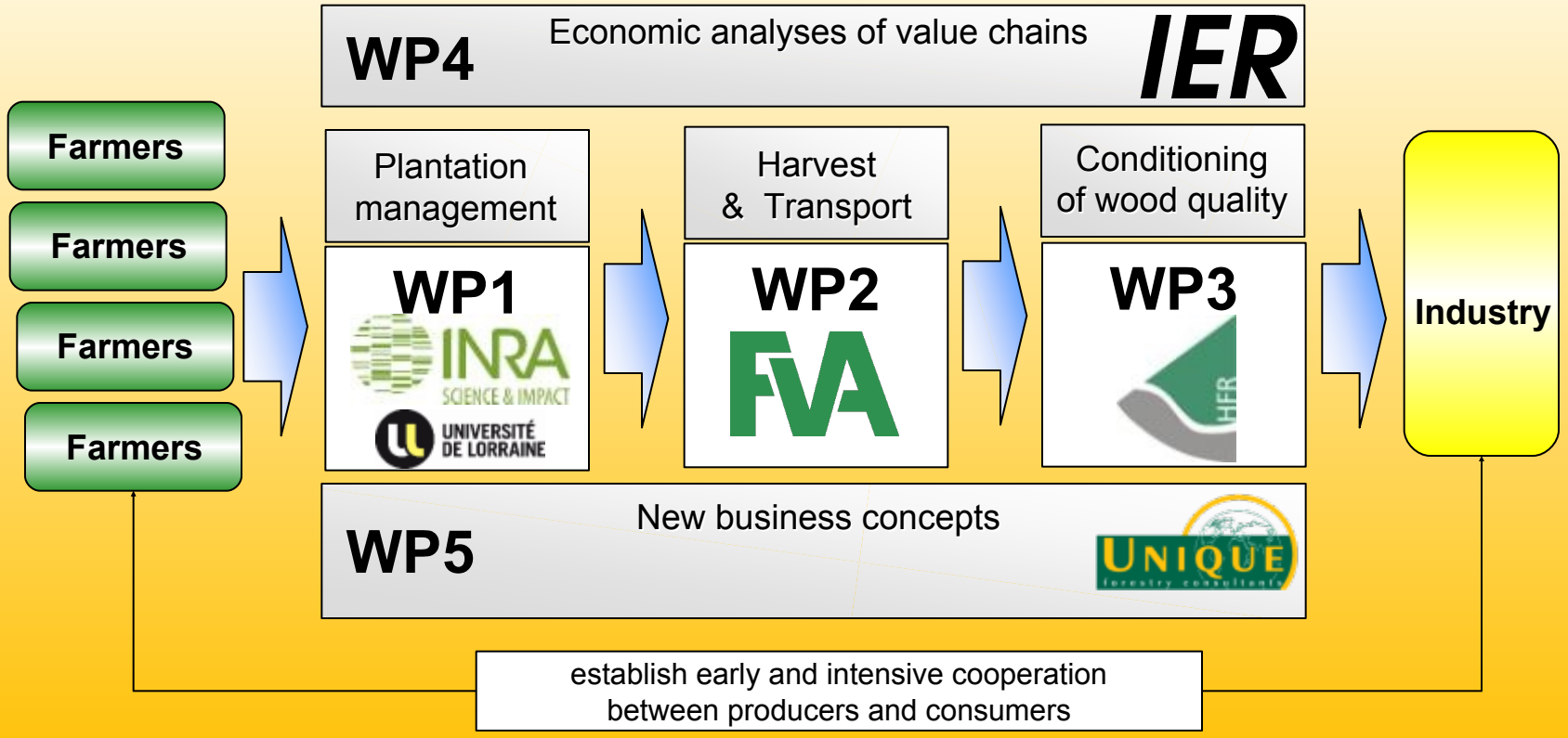
- 3 years (2008 – 2012)

- 5 scientific partners (INRA coordinator) + network of farmers and industrials

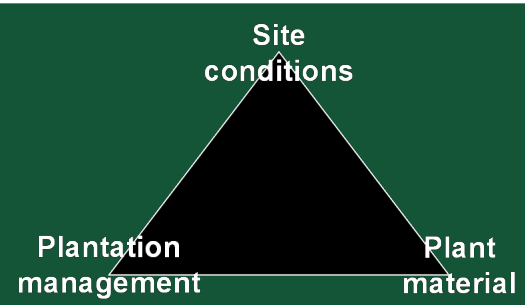


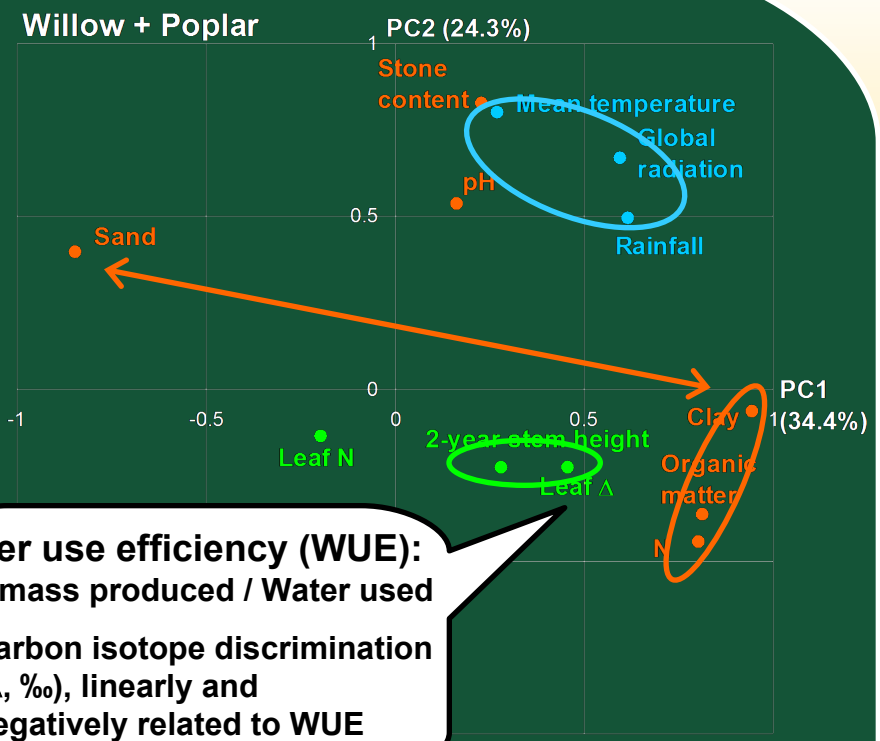
Who?

A complementary consortium:



Major achievements





Water use efficiency (WUE):
- Biomass produced / Water used

➔ Carbon isotope discrimination (Δ, ‰), linearly and negatively related to WUE

Nicolas Marron
Laureline Bes de Berc

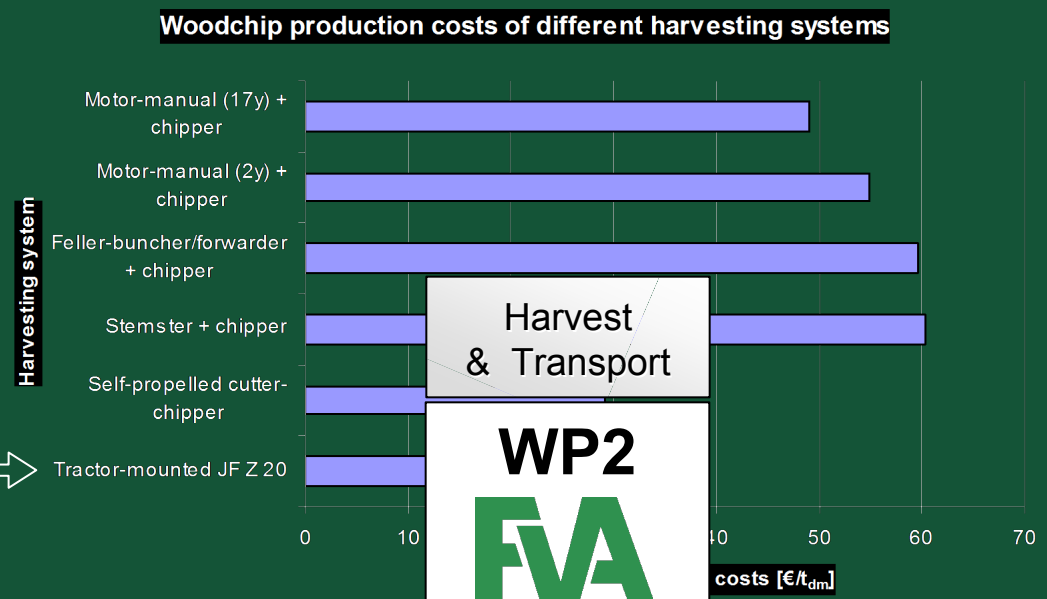
- Correlations within soil, climate and plant categories

… but few correlation between yield and either soil or climate

➔ Plantation management and plant characteristics are of primary importance for the first rotation

Major achievements

Michael Nahm
Frank Brodbeck



Harvest & Transport

WP2

FVA

- Without machine transport costs
- Without biomass transport costs

Only for 2-year old trees

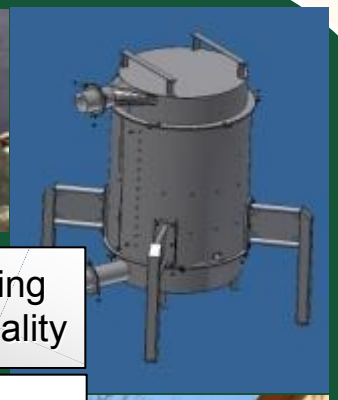
- Cutter-chipper = most cost-efficient
- Still, can only be recommended on sites with good biomass productivity

Semi-mechanized

Fully mechanized

Major achievements

SRC material storage efficiency:

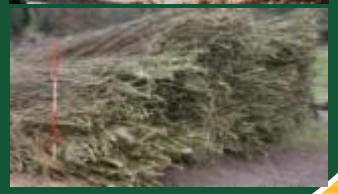


Conditioning of wood quality

WP3

+ Whole shoot drying most efficient, followed by breathable covered chip heap storage
  - *Uncovered chip heap storage is unfavourable*
+ Water content reduction (9 to 28%)
  Net calorific value increase (27 to 94%)

- Ash content rises, higher shares of fines
- Ash melting behaviour slightly negative



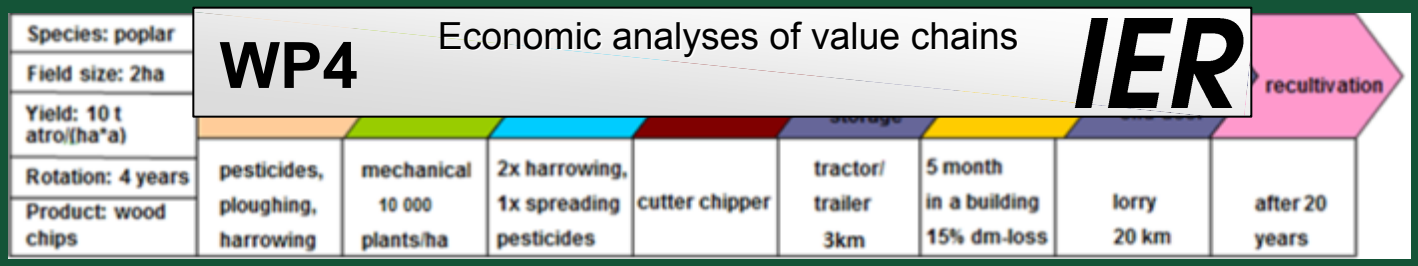
- Under a overall energy balance point of view, instant material use after harvest can be more efficient
- But storage can be necessary for many conversion techniques (e.g., small heating plants)
- Storage can give a higher added value

Jan Focke
Thorsten Beimgraben

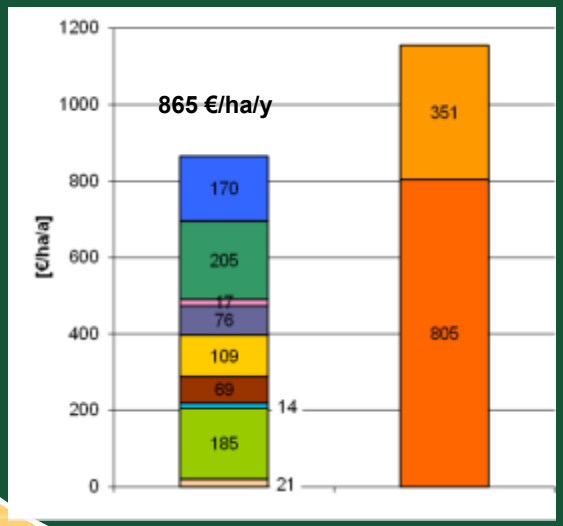
Major achievements

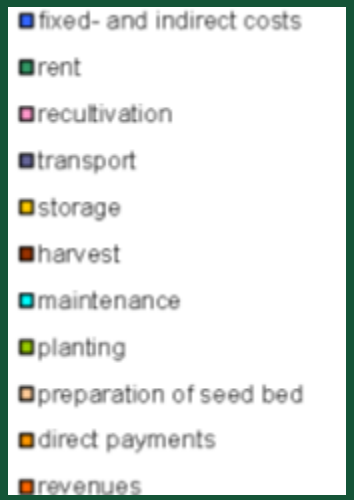
Stefanie Haid
Ludger Eltrop

Elements of the standard process chain

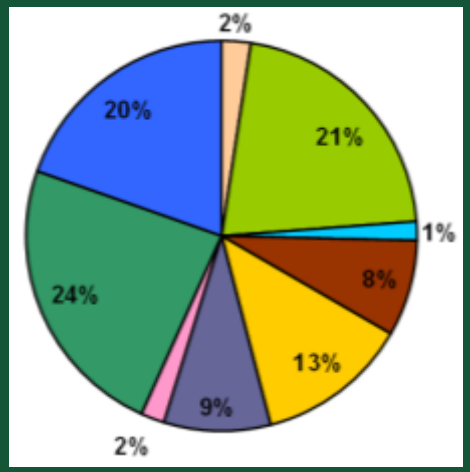


Total costs and revenues
for the standard process chain



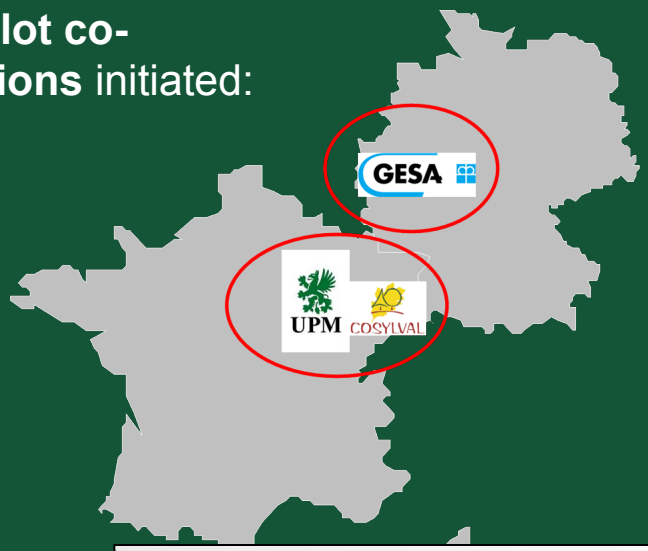


Share of costs
for the standard process chain



Major achievements

Two pilot co-operations initiated:



Starthilfe für Einsteiger

Die GESA gGmbH in Wuppertal bietet interessierten Landwirten fachliche Unterstützung bei der Anlage von Kurzumtriebsplantagen und langfristige Abnahmeverträge für Energieholz.

Entwicklungshilfe durch Creff-Projekt

GESA sucht interessierte Landwirte

Réduction du coût et augmentation de l'efficacité de la filière TCR

ainsi que l'établissement de chaînes d'approvisionnement optimisées au niveau régional sont les buts du projet de recherche ERA-NET 2009 - 2011

Taillis à courte et très courte rotation (TCR / TTCR) : production de biomasse ligneuse à partir d'espèces d'arbres à croissance rapide (peuplier ou saule) avec des rotations courtes (2 – 20 ans) sur des terres agricoles. Il s'agit de la forme moderne de l'ancien taillis simple à courte rotation (TSR).

Potentiels importants pour le „bois du champs" :

- Source de revenu supplémentaire et plurifoliée pour le domaine agricole
- Usage extensif des terres
- Indépendance du pétrole et du gaz
- Valorisation régionale
- Opportunité pour les terres marginales
- Bon bilan environnemental (bilan CO_2 neutre)
- Contribution à la protection de la nature

Mais répartition pauvre – pourquoi ?

- Manque de connaissances entre les décideurs, les agriculteurs et la population ?
- Manque de connaissances sur les produits issus de TCR auprès de l'industrie du bois ?
- Marchés instables, inexistants ?
- Manque de modèles régionaux commerciaux et de logistique ?
- Concurrence avec les produits agricoles „traditionnels" ?

Qu'allons nous analyser ?

Le but du projet est l'élaboration d'une chaîne d'approvisionnement attractive, lucrative et adaptée au contexte local:

- Production et gestion de plantations (sélectionn site, matériel végétal et itinéraire) ©INA
- Amélioration des techniques de récolte et de la logistique de transport INA
- Développement de nouveaux produits et de nouvelles utilisations issus de TCR
- Analyse économique, analyse de risque et des conséquences environnementales IER
- Nouveaux concepts commerciaux entre agriculteur et consommateur

www.creff.eu

Anbaukonzept - Kurzumtriebsplantagen für die Landwirtschaftspartner der GESA gGmbH

Freiburg, Januar 2009

The low level of implementation of WP5 opportunities is caused by:

- Lack of knowledge amongst farmers
- Undeveloped markets and unclear quality criteria for the final products
- Lack of knowledge amongst industrial consumers
- Absence of regional business- and logistics co-operations between producers and consumers

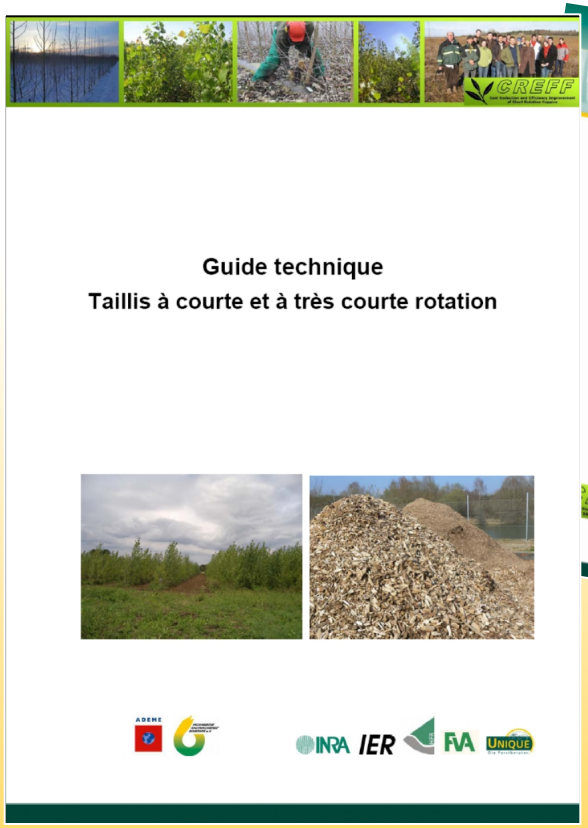
WP5 New business concepts

Laura Van den Kerchove, Axel Weinreich

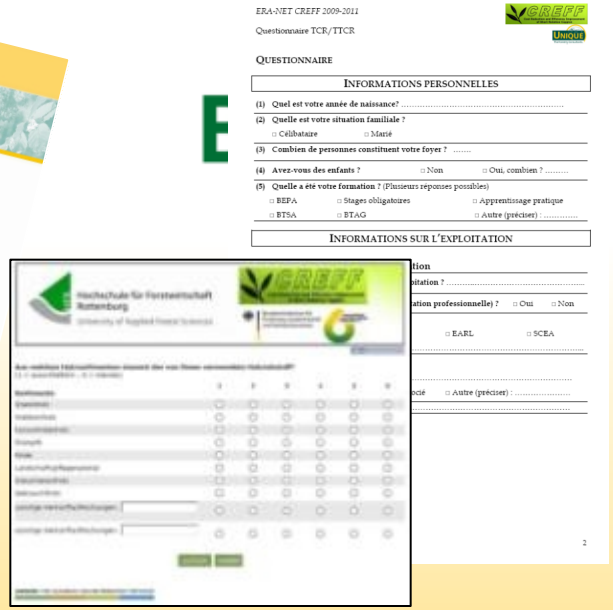
Lessons learnt

- SRC not competitive with traditional crops on medium/good sites
- SRC can be an opportunity to valorize unused unfavorable sites
- Some advices / recommendations to optimize the chances of success and profitability:
  - To establish producer – consumer co-operations
  - To define from the beginning the biomass end use
  - To adapt the plantation design to the requirements
  - To use plant material using efficiently resources or fixing atmospheric N
  - To use the plantation to valorize residual products, when possible
  - To plant mixture of species or varieties rather than monocultures
  - To plan harvest and logistic operation well in advance
  - To choose the conditioning method according to the planned end use

But financial support is needed to be profitable!

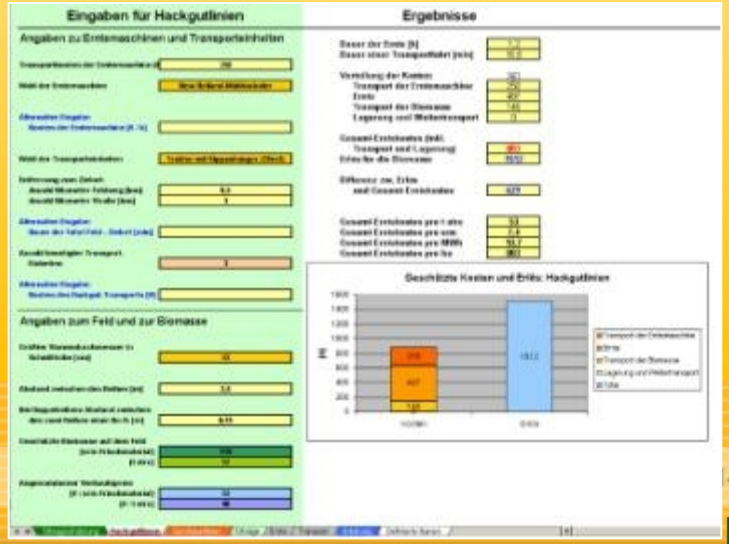


General and specific guidelines and recommendations



Survey questionnaires (HFR, IER, UNIQUE)

www.creff.eu



Harvest calculation tool (FVA)

Web site and literature database

Thank you!

Plantation management: INRA Nancy – Nicolas Marron (marron@nancy.inra.fr)

Business concept: UNIQUE Freiburg – Axel Weinreich (Axel.Weinreich@unique-landuse.de)

Moyenvic, July 2010 Rottenburg, October 2011

Economic analysis: IER Stuttgart – Ludger Eltrop (ludger.eltrop@ier.uni-stuttgart.de)

Conditioning: HFR Rottenburg – Jan Focke (focke@hs-rottenburg.de)
Thorsten Beimgraben (beimgraben@hs-rottenburg.de)

Harvest: FVA Freiburg – Michael Nahm (Michael.Nahm@forst.bwl.de)
Frank Brodbeck (Frank.Brodbeck@forst.bwl.de)