Business from technology

ENERFISH
Integrated Renewable Energy Solutions for Aquaculture Processing
Partnering for the Bioeconomy in European Regions
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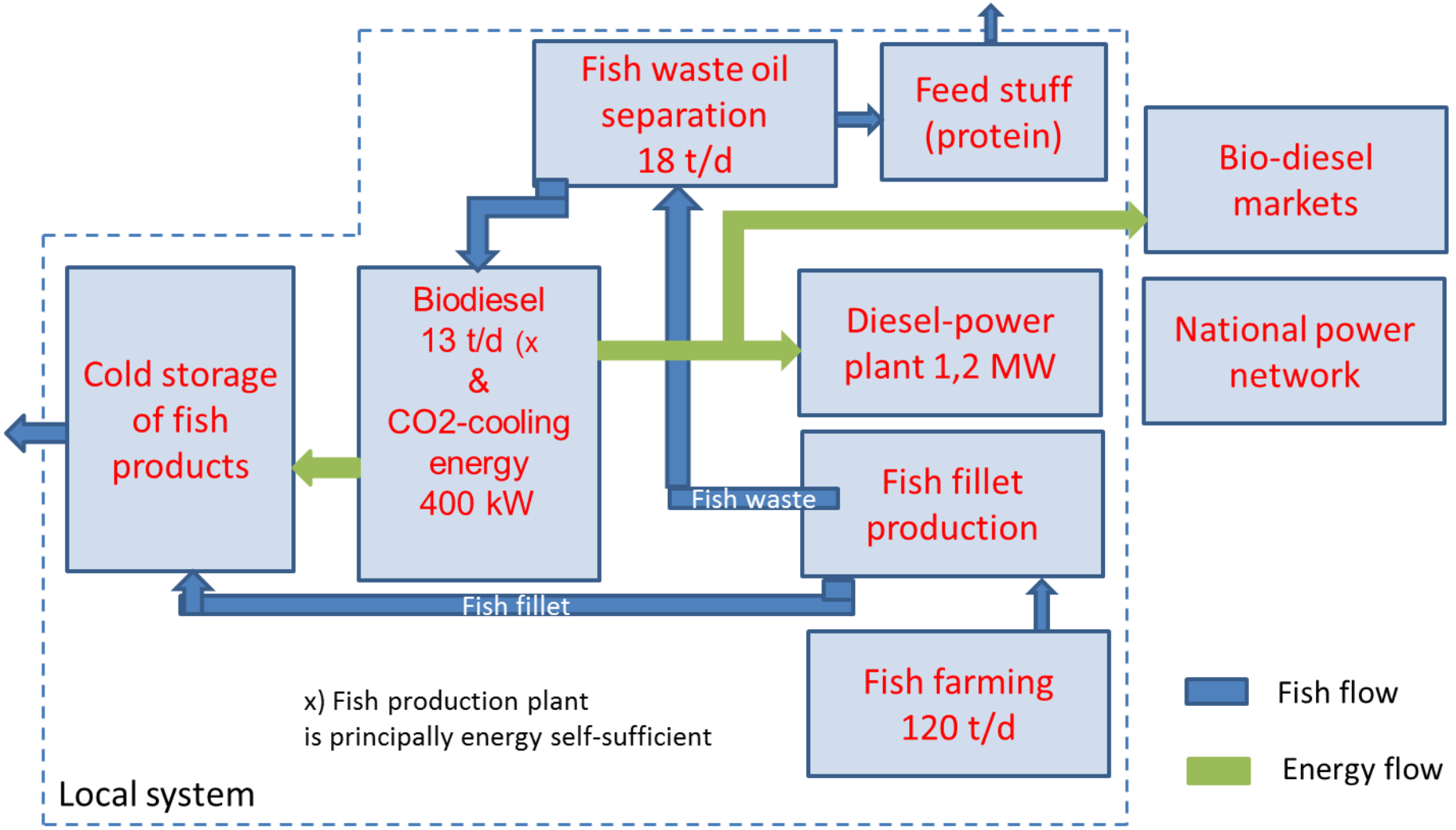
Project aims

- Demonstration of a new poly-generation application with renewable energy sources for the fishery industry. The distributed energy system utilizes cleaning waste of a fish processing plant to produce biodiesel. The biodiesel is used to produce the locally needed cooling/freezing and heating energy. In addition, a power surplus is generated for the electricity network or local industrial use.
- Development and demonstration of a cooling/freezing cascade based on CO2.
- The objective was to erect the demonstration plant in Vietnam for the following reasons
  - Vietnam's output of tra and basa catfish has recorded high growth rates over the past ten years, (from 22,000 tonnes to 800,000 tonnes)
  - Catfish (pangasius) is especially suited for our project due to its high fat content (22 %).
  - Furthermore choosing a demonstration site in Vietnam opens an enormous market for the demonstrated technology in SE Asia, where 9 out of 10 world’s top aquaculture producers are located.

Partners and funding

- Partners
  - VTT (Finland) – coordinator
  - TÜV Rheinland Energia und Umwelt Gmb (Germany)
  - Technofi (France)
  - National Energy Foundation (Great Britain)
  - Hiep Thanh Seafood Joint Stock Company (Vietnam)
  - Preseco (Finland)
  - Vahterus (Finland)
  - ECC (Vietnam)
  - RCEE - NIRAS Join Stock Company (Vietnam)
  - AFI-industry,JSC (Vietnam)
- Funding from FP7 +partners + National co-funding

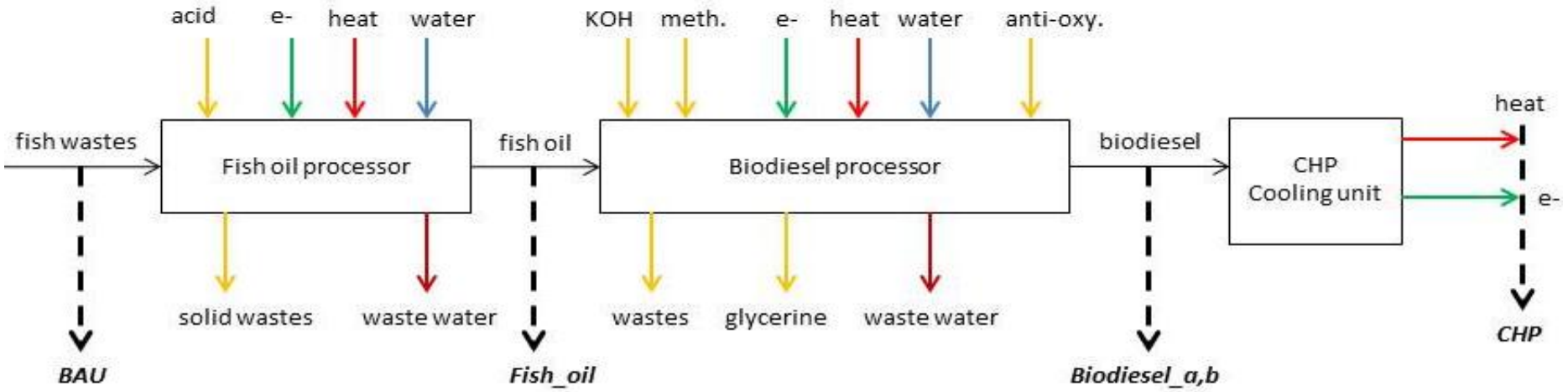
From fish waste to energy poly-generation & integrated cooling energy at fish production industry




Cao Bang
CHINA
Fan Si Pan Peak
Red River
Dien Bien Phu
Hanoi
Halong Bay
Haiphong
Ninh Binh
GULF OF TONKIN
HAINAN (China)
LAOS
TRUONG SON RANGE
Vinh
The DMZ
SOUTH CHINA SEA
Dong Hoi
Ben Hai River
Dong Ha
Quang Tri
Khe Sanh
Hue
Phu Bai
Hai Van Pass
Da Nang
THAILAND
Mang Yang Pass
Pleiku
An Khe
Quy Nhon
Mekong River
KAMPUCHEA (Cambodia)
Buon Me Thuot
Nha Trang
Da Lat
Cam Ranh Bay
Ho Chi Minh City
Vung Tau
Ben Tre
VIETNAM
Mekong Delta
Ca Mau


Mac Bai
Phan Thiet
Ho Chi Minh City
Chau Doc
My Tho
Long Hai
Vinh Long
Can Tho
Con Dao

Financial benefits based on various assumptions



► Business models :

> BAU: fish wastes are sold to the market.

> Fish-oil: the company invests in a fish-oil processor and sells fish oil to the market.

> Biodiesel_a: the company invests in both fish-oil and biodiesel processors and sells biodiesel to the market (as well as by-products).

> CHP: *Biodiesel_a* with a supplementary investment in a CHP unit which produces electricity and heat (sold to the market and/or used to produce energy locally). Surplus of biodiesel can be sold to the market.

> Biodiesel_b: the company only invests in the biodiesel processor, i.e. it sells its wastes to fish-oil processor and buys back fish oil.

Summary financial benefits based on various assumptions

► Fish oil business model :

> Economic duration of 15 years (lifespan of the equipment)

> For a market price of 244 €/t for fish wastes, the minimum price value of fish oil which gives profitability is 948 Euros/tonne. Therefore, under current market conditions, such an investment could be profitable, i.e. fish oil is currently traded at approximately 1100 €/t (if such price levels could hold for a period of 15 years).

► Biodiesel business model

> If fish wastes traded at 244 €/t, biodiesel must be sold at 1377 €/t reach a zero NPV.

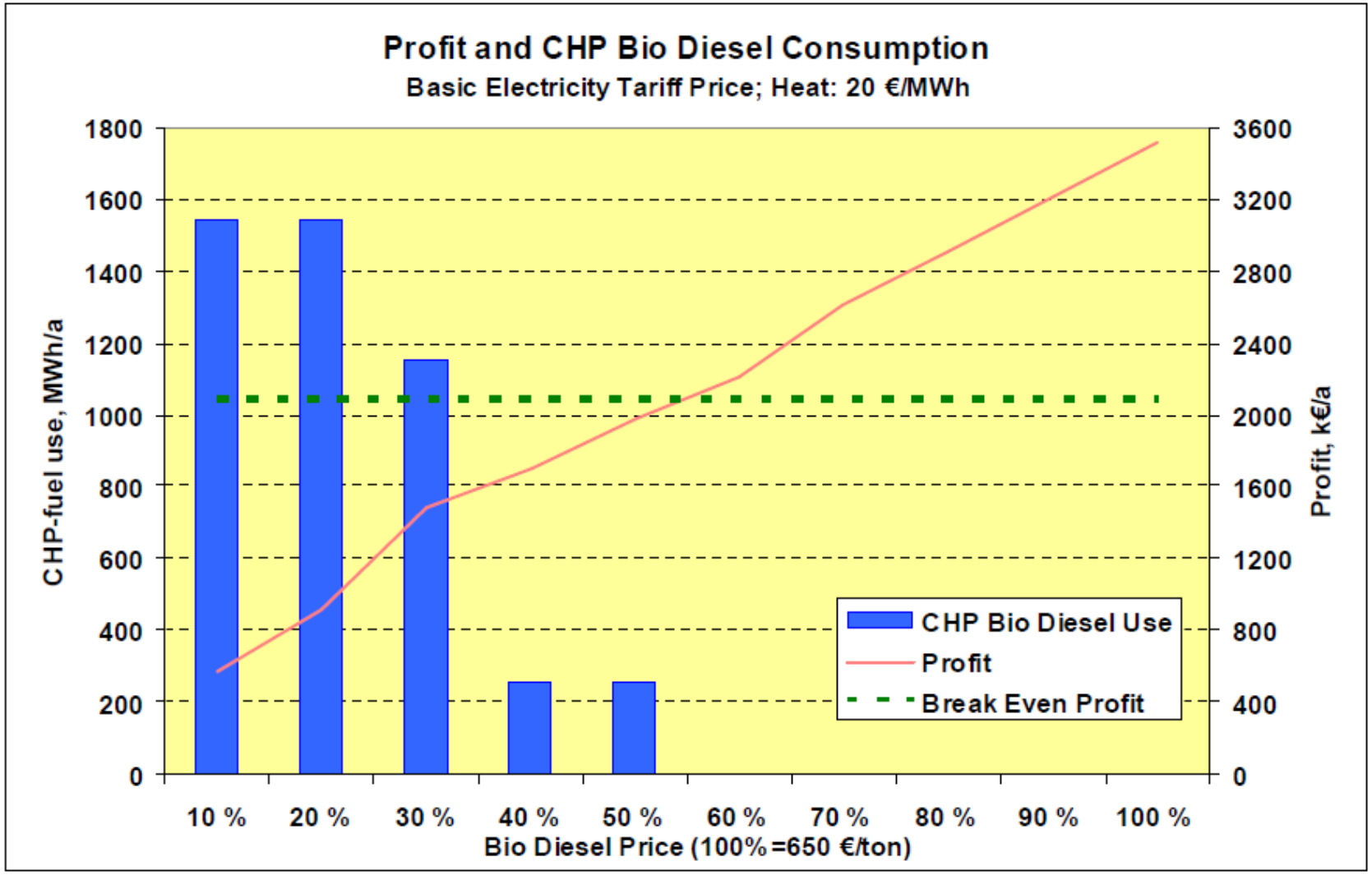


Figure 8. Economical use of cogeneration, and profit of biodiesel fuel alternative as a function of biodiesel market price. Price of heat energy is 20 €/MWh.

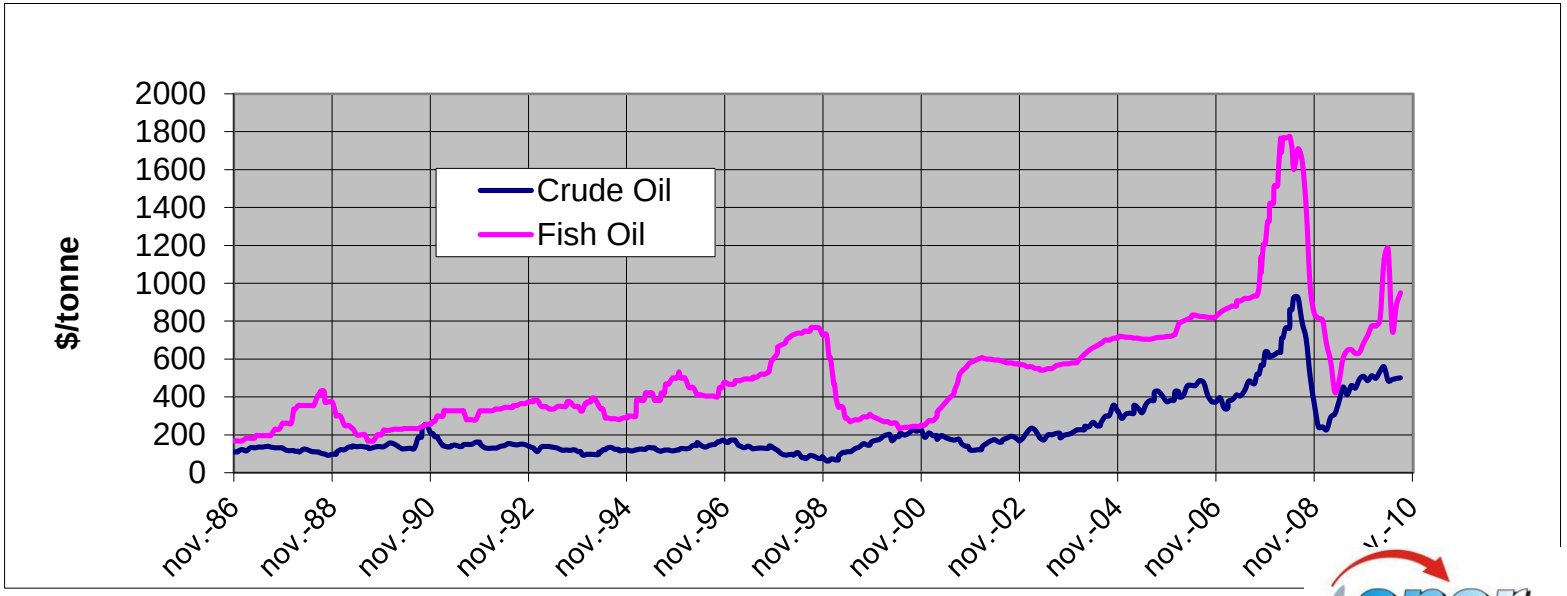
Market Potential in Europe

► Market potential in EU 27

> Homogeneous demand : 2020 targets.

> Supply limitations : EU 27 is a net importer of fish oil. Most fish oil used in the large salmon farming industry.

> Economics : viable only if subsidies. Competition for feedstock from other industries. Fish oil trades at a higher price than crude oil.



Conclusions

> Aquaculture farms are the main niche market for this technology; aquaculture has a very high efficiency in terms of waste processing. Waste processing can be performed on site, thus avoiding logistics and GHG emissions. The main markets for aquaculture will be Asia; Europe is a rather small market, aquaculture is mainly focused on cultured salmon.

> No specific demand today for fish wastes or fish oil to produce biodiesel. The main uses of fish wastes are the production of fishmeal and fish oil mainly for diets for aquaculture and farmed animals. Two sectors have increased their pressure on fish oil supply: the human food industry and the pharmaceutical industry.

> Enerfish-like processes are likely to remain technical solutions for niche markets where fish wastes are not valorised and/or where there is no organised supply of fuels.

VTT creates business from technology