

PROJECT REPORT

11 - 01



Rannsóknastofnun fiskiðnaðarins

MAY 2001

ORKUSPAR AN ENERGY EFFICIENCY IMPROVEMENT SIMULATOR

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Titill / Title	ORKUSPAR - The Energy Efficiency Improvement Simulator		
Höfundar / Authors	Eva Yngvadóttir, Helga R. Eyjólfsdóttir		
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Ágrip á íslensku:	<p>Þessi verkefnaskýrsla greinir frá fyrsta verkefnafundi í fjölþjóðlegu verkefni sem nefnist „ORKUSPAR - hermir til að bæta orkunýtingu.“ Um var að ræða tveggja daga verkefnafund sem haldinn var í Reykjavík 21-22 maí 2001.</p> <p>Verkefnið er til tveggja ára og er fjármagnað af Save II áætlun ESB og þátttakendum verkefnisins.</p> <p>Markmið verkefnisins er að þróa orkuhermi, „ORKUSPAR,“ sem getur gefið vísbendingar um hvernig hægt er að minnka olíunotkun hjá flutningaskipum og í fiskiðnaði, bæði á sjó og í landi. Hermirinn er sérstaklega ætlaður skipahönnuðum, stjórnendum í fiskvinnslu,útgerðarfyrirtækjum, skipafyrirtækjum, rannsóknastofnunum í fiskiðnaði, tækniskólum og háskólum.</p> <p>Árið 2000 var heildarolíunotkun Íslendinga um 860.000 tonn. Þar af notuðu fiskiskip 28,4% og önnur skip 9,2%. Stóran hluta af losun koldíoxíðs (CO2) í andrúmsloft á Íslandi má rekja til olíunotkunar skipa og er ljóst að mikill fjárhagslegur og umhverfislegur ávinningur er fólgin í því að finna leiðir til að draga úr þeirri notkun.</p> <p>Þátttakendur í verkefninu eru frá:</p> <p>Íslandi: Rannsóknastofnun fiskiðnaðarins, Tækniskóli Íslands, Orkustofnun, Grandi hf og Skipatækni ehf.</p> <p>Svíþjóð: Svensk Energi, Energivision AB og Fiskeriverket</p> <p>Noregi: Vestlandsforskning.</p> <p>Niðurstöður verkefnisins munu verða kynntar á ráðstefnum og sjávarútvegssýningum, auk greinaskrifa í fagtímarit.</p>		
Lykilorð á íslensku:	Orka, sparnaður, nýting, hermir, sjávarútvegur, flutningaskip		



Summary in English:

This project report describes the first meeting in a European project called "ORKUSPAR - an energy efficiency improvement simulator," held in Reykjavík 21-22 May 2001.

This is a two year project financed by the EU (SAVE II programme) and the participants.

The goal of the project is to develop an Energy Efficiency Improvement Simulator, ORKUSPAR, specifically aimed at ocean freight shipping and the fishing industry, both sea and land based. The purpose of the ORKUSPAR-simulator is to provide an effective tool for the assessment and monitoring of envisaged energy efficiency measures.

The end-users especially targeted for the ORKUSPAR simulator are: Sea fishing trade associations, shipbuilders, fish processing plant manufacturers and designers, individual fishing and fish processing companies, fisheries research institutions, shipping companies, technical colleges, universities.

The total oil consumption in Iceland in the year 2000 was 860.000 tonnes, of which fishing vessels used 28.4% and other ships 9.2%. A large portion of carbon dioxide (CO₂) emission in Iceland derives from the fishing fleet. It is therefore evident that substantial financial and environmental benefits can be made with a tool that can minimize the oil usage.

The participants in the project are as follows:

Iceland: Icelandic Fisheries Laboratories, The Icelandic College of Engineering and Technology, The National Energy Authority in Iceland, Grandi hf, Skipatækni LTd.

Sweden: Energivision Stockholm, Swedish Energy,
National Board of Fisheries in Sweden

Norway: Western Norway Research Institute

The ORKUSPAR software will be exhibited in Trade Journals and at Fishing Industry Fairs.

English keywords: *Energy, economy, efficiency, simulator, fishing industry, freight shipping*

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1. INTRODUCTION

A start-up meeting was held in Reykjavík on May 21-22, 2001, in the project "ORKUSPAR - an Energy Efficiency Improvement Simulator". This is a two year project which officially started on 1. April 2001.

The objective of this project is to develop an energy efficiency improvement simulator, called ORKUSPAR in Icelandic, specifically aimed at ocean freight shipping and the fishing industry, both sea and land based. The purpose of the ORKUSPAR simulator is to design an effective tool for the assessment and monitoring of envisaged energy efficiency measures. It quantifies attainable energy efficiency improvements for owners, management, designers and operators of the relevant facilities (process plants, freezing plants, ocean trawlers, container and other shipping), energy use and environmental pathways in shipping and deep-sea fishing vessels (fish processing trawlers). The software simulates economic and other benefits gained by diverse measures, and it is, e.g., intended to:

- decrease primary fossil fuel consumption
- improve energy efficiency of processing systems
- improve automatic control and monitoring of systems
- decrease deleterious pollutant emissions

The overriding aim is to decrease harmful gaseous emission out into the atmosphere in a sustainable manner, whilst trying to meet the targets set in Agenda 21 and subsequent Kyoto declarations.

The end-users especially targeted for the ORKUSPAR simulator are: Sea fishing trade associations, shipbuilders, fish processing plant manufacturers and designers, individual fishing and fish processing companies, fisheries research institutions, shipping companies, technical colleges, universities, etc. in the European Union and the associated states.

2. OBJECTIVE

The goal of this first meeting was to:

1. Give the participants opportunity to meet and get to know each other.
2. Discuss the workplan of the project.
3. Make an action plan for the work that needs to be done in the project until the next meeting.
4. Decide where and when the next meeting should take place.

3. RESULTS AND DISCUSSION

During this first meeting, the participants went through the whole project application and every work phase was discussed in detail. The proceedings from the start-up meeting are in appendix 1. During the discussion, an action plan was made. The plan indicates clearly the work which each participant needs to perform and the date when it should be finished before our next meeting. This action plan is in appendix 2. Productive discussions between participants lead to the following main conclusions:

1. The output of the simulator needs to be very specific in the beginning. It is very important that the end users make a list of data specifications they want to get out of the simulator and prioritise that list.. It will be very difficult to change that later in the project.
2. The end users and the computer company need to work closely together to make sure that the simulator will work correctly and that the scope of the project fits the budget.
3. The participants need to use every opportunity to introduce the project and the simulator. An introduction poster will be made which all participants can use. A homepage will be made soon which will gradually expand as the the project will develop.
4. Participants need to send quarterly reports to the project coordinator so that the progress of the project can be properly monitored.

5. To make certain what will happen to the simulator once the project is finished, that is to say who will update the simulator, market it, sell it etc. The participants will make and sign a consortium agreement which will clarify every detail.

4. CONCLUSIONS

During this two day meeting, the participants had successful discussions about the proceedings of the project, which will, hopefully, result in a better way to achieve the goal of the project. The participants got to know each other, both socially and professionally. The group had a good visit to Samskip (a shipping company,) and to the Blue Lagoon. The participants need to work well together between meetings and be in good E-mail and/or phone contact.

Next meeting is planned in Stockholm in Jan/Feb 2002.

5. APPENDIX

1. Proceedings from the start up meeting
 - List of participants
 - Agenda for the start up meeting 21-22 May 2001
 - Slides from presentations at the meeting
2. Action plan

Start-up meeting in the project "The Energy Efficiency Improvement Simulator ORKUSPAR", held in Reykjavík 21 and 22 of May, 2001.

Sunday 20 May, 2001

19.00-21.00 Light dinner at Eva's house (Urðarstekkur 6)

Monday 21 May, 2001

Chairman Helga R. Eyjólfsdóttir, IFL

09.00 Introduction, everyone introduces themselves and the company or institute, 5-10 minutes each, (overhead projector can be used).
10.00 Brief introduction of the project, Eva Yngvadóttir
10.30 Coffee
10.45 Overview of energy usage in the fish industry both sea and land based, Sigurjón Arson
11.25 Overview of energy use in sea transport, Otto Andersen
11.45 Lunch
12.45 Phase I, data collection and Phase II data analysis and sorting, Sigurjón Arason and Paul Jóhannsson
Discussion / workplan
14.00 Phase III, Simulator Development
Demonstration of an Internet program, Georg Saros
Discussion / workplan
16.00 Visit to a company
18.00-21.00 The Blue Lagoon and dinner

Tuesday 22 May, 2001

Chairman Helga R. Eyjólfsdóttir, IFL

09.00 Phase V, dissemination, Eva Yngvadóttir
Discussion / workplan
10.00 Phase VI, project management, Eva Yngvadóttir
Discussion / workplan
Consortium agreement-do we need one?
Consortium contract
12.00 Lunch
13.00 Conclusion and planning of the next meeting
14.00 Closing

Start-up meeting in the project "The Energy Efficiency Improvement Simulator ORKUSPAR", held in Reykjavík 21 and 22 of May, 2001.

Participants:

Georg Saros	Energivision Stockholm AB, (EVI)
Krister Carlsson	Swedish Energy, (SVE)
Staffan Larsson	National Board of Fisheries, Sweden, (Fiskeriverket)
Otto Andersen	Western Norway Research Institute, (WNRI)
Paul Jóhannsson	The Icelandic College of Engineering and Technology, (TÍ)
Árni Ragnarsson	The National Energy Authority, Iceland, (OS)
Einar Tjörvi Elíasson	The National Energy Authority, Iceland, (OS)
Rúnar Stefánsson	Grandi hf
Guðmundur Hafsteinsson	Grandi hf
Eva Yngvadóttir	Icelandic Fisheries Laboratories, (IFL)
Helga R. Eyjólfsdóttir	Icelandic Fisheries Laboratories, (IFL)
Sigurjón Arason	Icelandic Fisheries Laboratories, (IFL)

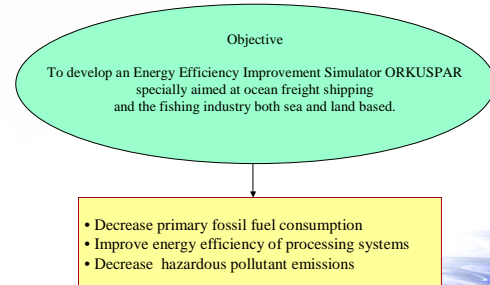
ORKUSPAR The energy efficiency improvement simulator

- Icelandic Fisheries Laboratory, (IFL): Eva Yngvadóttir, Helga Eyjólfssdóttir, Sigurjón Arason
- The Icelandic College of Engineering and Technology, (TÍ): Paul Jóhannsson
- The Energivision Stockholm AB, (EVI): Georg Saros
- The Swedish Energy, (SVE): Krister Carlsson
- The National Energy Authority in Iceland, (OS): Árni Ragnarsson
- Western Norway Research Institute (WNRI): Otto Andersen
- The End-users group:
 - Skipataekni Ltd: Bárður Hafsteinnsson
 - Grand hf: Rúnar Stefánsson
 - Fiskeriverket: Staffan Larsson

EY: ORKUSPAR start-up meeting 21-22/05/01



ORKUSPAR -The energy efficiency improvement simulator



EY: ORKUSPAR start-up meeting 21-22/05/01



Phase Descriptions

- **Phase 1, Data Collection:** Project Start-up, detailed scheduling and inventory of data
- **Phase 2, Data Analysis and Sorting:** Data interpretation sorting and collation
- **Phase 3, Simulator Development:** Programming, workshop trials and modifications
- **Phase 4, Trials and Modifications:** Experimental run, modifications and updating
- **Phase 5, Dissemination:** Dissemination, follow-up activity and updating
- **Phase 6, Project-Management:** Project co-ordination, management, progress monitoring and reporting

EY: ORKUSPAR start-up meeting 21-22/05/01



Tentative time and Work Schedules

Time schedule (months)

Months from start	Phase responsibility	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Phase #1	IFL																								
Phase #2	TI																								
Phase #3	EVI																								
Phase #4	IFL																								
Phase #5	IFL																								
Phase #6	IFL																								

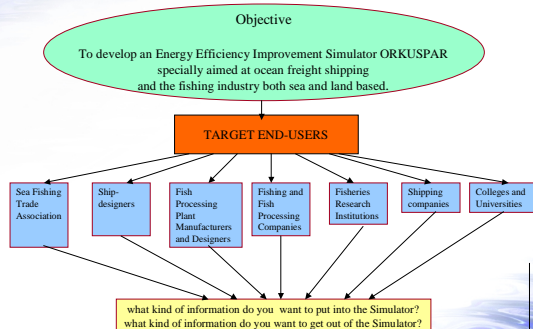
Work schedule (man-days)

Proposer	IFL	TI	SVE	OS	EVI	WNRI	End-users	TOTAL
Phase #1	34	11	6	6	10	12	15	94
Phase #2	20	12	0	0	18	10	10	70
Phase #3	6	6	0	0	92	4	0	108
Phase #4	13	15	4	4	23	10	15	84
Phase #5	34	12	4	4	30	14	3	101
Phase #6	50	4	4	4	4	4	0	70
Total	157	60	18	18	177	54	43	527

EY: ORKUSPAR start-up meeting 21-22/05/01



ORKUSPAR - The energy efficiency improvement simulator



EY: ORKUSPAR start-up meeting 21-22/05/01



what kind of information do you want to put into the Simulator?
what kind of information do you want to get out of the Simulator?

Input Data/Information

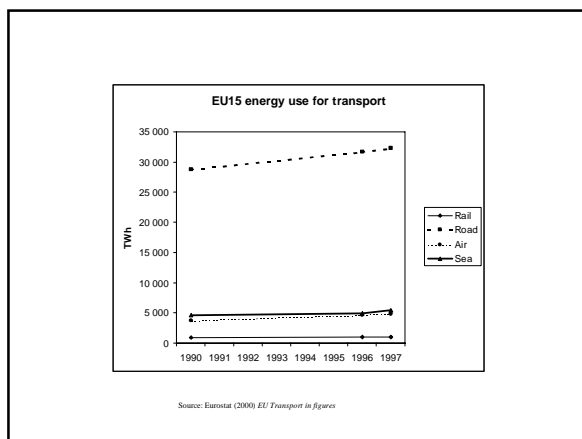
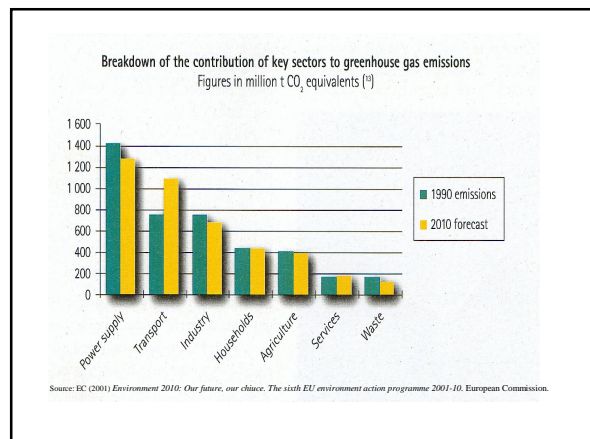
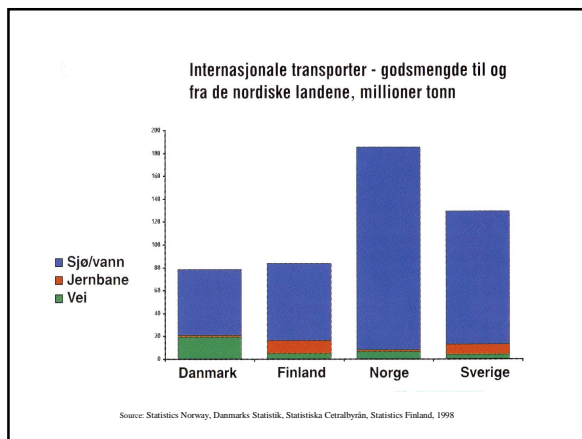
- Real data for energy usage
- Energy efficiency investment costs
- Maintenance costs
- Energy prices
- Energy expenditure for different uses

Output Data/information

- Assessment of potential efficiency improvement measures
- Analyse energy efficiency for target end-users
- Potential savings in cost and energy
- Cash flow over ten years
- Calculated payback
- Environmental benefits
- Actual energy expenditure compared with standard or average values

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Energy efficiency of Norwegian sea transport

	Energy efficiency kWh/tonnekm
Ferries	7,103
Long distance services	1,870
Local services	3,034
Freight vessels 100-500 Gwt	0,420
Freight vessels 500-3000 Gwt	0,338
Freight vessels >3000 Gwt	0,052
All vessels	0,194

Source: Thune-Larsen et al. (1997). Energy efficiency and emissions in transport. TØI working report 1078/1997 (in Norwegian). Oslo: Institute of Transport Economics.

Energy efficiency of Norwegian sea transport cont.

	Energy efficiency kWh/tonnekm	Load factor %
Tankers and combined vessels		
101-500 gross tonne	0,49	78
501-3000 gross tonne	0,28	70
> 3000 gross tonne	0,05	75
Dry cargo vessels		
101-500 gross tonne	0,34	75
501-3000 gross tonne	0,28	72
> 3000 gross tonne	0,08	69

Source: Høibak og Rypdal (1997) Energibruk og utslipp til luft fra transport i Norge. SSB rapport 97/7 (in Norwegian). Statistics Norway

Technical and user manual

Dissemination

FYORKUSPAR start-up meeting 21.22/06/01



Tentative Dissemination Schedule

[illegible]

EY-ORNL/SPAR start-up meeting 21-22/05/01



- Ship and plant owners
- Fishing vessel and fish process plant designers and operators
- Shipping companies

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- Internet homepage
- Distribute brochures
- Write-ups in fisheries and shipping trade journal
- Introduce the project everywhere possible

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- International trade fair held in Brussels every year
- The Fishing/Commercial Fishing and Processing Exhibition held in Glasgow March 2002
- Nordfish trade fair
- etc.

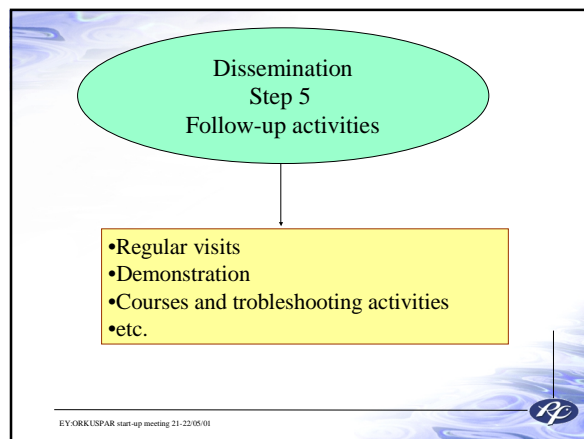
EYORKUSPAR start-up meeting 21.22/05/01



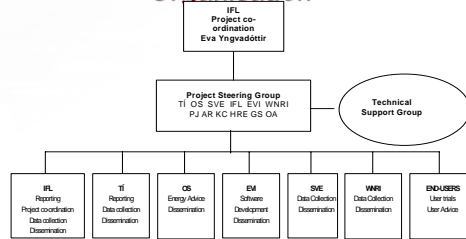
- The College of Engineering
- Universities
- etc.

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Phase 6 Project Management and Organisation



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Performance or Success Indicators

- **Phase 1: Data Collection**
 - Input: Data will be collected from:
 - Surveys
 - Questionnaires
 - PI/SI:
 - Quantity of relevant data found
 - Number of positive response
- **Phase 2: Data Evaluation**
 - Input: Data evaluated and written into a central databank
 - PI/SI: Ratio of relevant data
- **Phase 3: Bench Trials**
 - Input: Software set up for 10-15 Bench Trials
 - PI/SI: Number of re-runs

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Performance or Success Indicators

- **Phase 4: Trials under real conditions**
 - Input: Software will be given to 7 pre-selected entities
 - PI/SI: Customers satisfaction
- **Phase 5: Promotion and Dissemination**
 - Input:
 - Mail 100-200 promotion brochures
 - Articles in trade journals
 - Seminars or courses
 - PI/SI:
 - Number of queries
 - Number of seminar/courses

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Progress monitoring

- **Quarterly Report**
 - Work carried out
 - Dissemination
 - Results and conclusion
 - Problems encountered
 - Workplan next period
 - Brief summary of allowable costs

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Financing the Project

- Total eligible costs EUR 427.763
- Support from the SAVE programme EUR 175.000
- 39,98% of the eligible costs of the project
- 40% of the grant at the beginning
- 30% of the grant after an Interim Progress Report
- 30% of the grant after final report

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Distribution of support from the SAVE programme

Financial Analysis (Euro)								
	Total (Euro)	IFL	TI	SVE	OS	EVI	WNR	End-users
Total cost (all phases together)	437763	145262	46980	10680	17994	137620	35508	37819
Distribution of support requested from the SAVE programme	175000	63501	20568	7303	7878	60206	15545	0
Distribution of support requested %		36	12	4	5	34	9	0
40% of the grant in June 2001	70000	25400	8227	2921	3151	24082	6218	0
30% of the grant in August 2002	52500	19050	6170	2191	2363	18062	4664	0
30% of the grant in May 2003	52500	19050	6170	2191	2363	18062	4664	0
Expected income	0	0	0	0	0	0	0	0
Financial contribution of the Proposers	262763	81761	26412	8277	10116	77214	19983	37819
Any other financing	None	None	None	None	None	None	None	None
Distribution of work in man-days	527	157	60	18	18	177	54	43

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Discussion

- Consortium agreement
- Consortium contract

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Actionplan for ORKUSPAR- Energy Efficiency Improvement Simulator			
Time period:			
	Partner	Work	Deadline
Phase 1, Data Collection	IFL	List specification for fishing vessels, make priorities	21. June '01
	IFL	List specification for fish industry on land, make priorities	21. June '01
<i>step 1, Specification of output</i>	IFL	Send the specification from Grandi and Skipatækni to Georg (EVI)	21. June '01
	TÍ	Adviser	
	OS	Adviser	
	EVI	Comment on specifications	9. July '01
	SVE	Adviser	
	WNRI	List specification for ocean freight ships	21. June '01
	WNRI	Send the specification to Georg (EVI) or IFL	21. June '01
	Grandi	List specification for fish industry, both land and sea based,	21. June '01
		Make priorities to that list.	21. June '01
	Skipatækni	List specification for fishing vessel	21. June '01
		Make priorities to that list.	21. June '01
	Fiskeriverket	Adviser	
	Dialouge between partners should be finished for this step		sept '01
Phase 1, Data Collection	IFL	Make questionnaires with WNRI	Okt '01
<i>Step 2, data collection</i>		Send questionnaires	Okt. '01
		data collection	Jan. '02
	TÍ	data collection	Jan. '02
	OS	Adviser	Okt. '01
	EVI		
	SVE	data collection	Jan. '02
	WNRI	Make questionnaires with IFL	Okt. '01
	WNRI	send questionnaires	Okt. '01
	Grandi	data collection	Jan. '02
	Skipatækni	data collection	Jan. '02
	Fiskeriverket	send IFL a list of companies which questionnaires can be sent to	Okt. '01
	Fiskeriverket	data collection	Jan. '02
	The results from the questionnaires should appear before		Jan. '02

	Partner	Work	Deadline
Phase 2, Data analysis and sorting	IFL	Data collection and sorting	Feb '02
	TÍ	Data collection and sorting	Feb '02
	EVI	Write the data into a databank	Feb '02
	WNRI	Data collection and sorting	Feb '02
	Grandi	Data collection and sorting	Feb '02
	Skipatækni	Data collection and sorting	Feb '02
	Fiskeriverket	Data collection and sorting	Feb '02
Phase 3, Simulator Development	IFL	Advisor	
	TÍ	Advisor	
	EVI	Start programming	July '01
	WNRI	Advisor	
Phase 4, Trials and modification			
		This phase will start in March '02	
		and will be discussed at the next	
		meeting in Jan/Feb '02	
Phase 5, Dissemination	All	Introduce the project everywhere possible, report it to IFL	continually
	IFL	Homepage	Sept '01
	IFL	Brochures	Okt '01
	IFL	Poster (introduction slides)	Okt '01
	IFL	Make a list of dissemination/introduction events	continually
	Fiskeriverket	Send to IFL links of energy groups around Europe	August '01
Phase 6, Project management	All	send quarterly report to IFL	17.Sept '01
	IFL	Send a standard quarterly report to participants	03.Sept '01
	IFL	Make a first draft of Consortium agreement	Okt '01
	EVI	Make a first draft of Consortium agreement	Okt '01