Technical Requirements

Open Source Ecologie team (OSE French chapter) is researching and developping the linear fresnel reflector. These are the requirements we expect from the solar concentrator of this kind, these requirements will

The current work in progress is located here or on the Collaborative pad

you can see 2 columns describing the level required at the 2 different phases of the project, for each requirement we expressed the rate of achievement required.

Phase 1 - Demonstrateur : is the proof of concept that will be presented in the " Villages des alternatives" in Paris the September 26th 2015 of 4m^2 of mirrors. Phase 2 - Prototype a: is the full scale product that we expect to deliver early 2016 after a crowdfunding campaign launched during the Villages des alternatives. This will be the Alpha prototype.

The French ethercalc version of this work-in-progress product specification requirement is located here

this document is part of the Product Requirement Document

Introduction

Added to this list of specific requirements, the general OSE Specification for product design should be also applied during the conception and design.

After conception and design are completed, a score will be attributed based on the Ose Specifications evaluation Template and its adherence to the below set of requirements.

the discussions can be carried out on the http://forum.osefrance.org/viewforum.php?f=5 open forum

General

General on the Forum

Requirement	Prototype	Demonstrateur
Linear Fresnel reflector (primary concentration)	Yes	Yes
Second stage concentration on the absorber	Optimised CPC	Yes
Heat power output	5 kW	Defined by mirror surface
Mirror surface	Defined by power output	4 m2
Working temperature	250°C	140°C
Concentrator orientation	both E/W and S/N	E/W
DIY friendly (standardisation of pieces, etc.)	Yes	No

Structure

Structure on the Forum (independant structures : pro: less vibrations, cons: harder to align correctly)

Supporting Structure

Requirement	Prototype	Demonstrateur
Independent structures for the primary concentrator and the absorber	yes	Optionally
Structure able to hold the weight of the system	yes	yes
Structure sufficently rigid to sustain vibrations and impacts	yes	70%
Ground implantation must assure sufficient stability		not required
Easily assembled with modular-easy to transport components	70%	70%
Structure and design OSE Compatible http://opensourceecology	Yes	Optional
Welding	The least possible	The least possible
*Configuration E/W: Designed to allow daily full concentration	1 focal per side	Pivotable tructure
Must be designed to reduce any risk concern	80%	60%
Cost optimized	80%	60%

Discussions will follow to allow modularity of different absorbers, indipendent concentration source, different working Axis

Mirrors Structure

Requirement	Prototype	Demonstrateur
Structure of each mirror to avoid deformation due to weight	100%	
Must allow mirrors rotation to follow the sun	180°	>60°
Weather protection	mirror flip	undefined
Reclinable support of the mirrors for seasonal optimization		inclination angle = latitude
Easy optical alignment (assured by any mean - ie. Tracks, guidelines, holes, etc)	100%	100%

Optical Concentration

Optical concentration

	Prototype	Proof of concept / Demonstrateur
Mirror's Geometry to be (to define based on best optical optimization, in progress)		
Mirrors with high reflectivity (>90% on wide spectrum)	100%	100%
resistant mirrors with high lifespan for external usage.	100%	100%
Mirrors easy to clean	100%	70%
Secondary concentration on the absorber higher than 2x	100%	70%
total factor of concentration 25	100%	70%
mirrors easy to fix and replace on their support	100%	70%

must be designed to reduce any risk concern	80%	60%
Cost optimized	80%	60%

Absorber

Absorber

	Prototype	Proof of concept / Demonstrateur
specially designed for the selected thermal fluid, with passive o	100%	100%
Absorbing material with high optical absorbtion rate on wide sp	100%	100%
elevated thermal exchange Absorber / Fluid	80%	60%
high thermal insulation (from external air, from the point of con	80%	60%
High resistance of thermal variation constraints (high temperatu	80%	60%
Specially designed for the secondary concentrator	80%	60%
must be designed to reduce any risk concern	80%	60%
Cost optimized	80%	60%

Motors, Tracker, Programs

Motors, trackers, programs

	Prototype	Proof of concept / Demonstrateur
Must allow for a real time follow & programmed sun follow base	80%	60%
Automatically detect and self protect in case of bad weather	80%	60%
Must be able to track the sun and send the correct angle in order	80%	60%
Must be able to sense temperature and pressure at fluid input a	80%	60%
programmable to stop automatically	80%	60%
must provide an easy GUI control interface (optionally handled t	80%	

Modelling and studies

Modeling and studies

	Prototype	Proof of concept / Demonstrateur
Optimisation of Solar concentrator design	80%	60%
Self pilot of the solar concentrator (must perform a logical analy	80%	40%
Tools to predict energetical production based on geography		
Model of economical and technical conditions for optimal usage of the solar concentrator		
Finalize localized business case	80%	40%

Identify technical modifications needed to adapt to new usage	80%	40%