

Carbon Disclosure Project

Module: Introduction

Page: Introduction

0.1

Introduction

Please give a general description and introduction to your organization

REC was established in Norway on December 3, 1996, and has grown to become one of the world's leading suppliers of solar and electronic grade polysilicon, and a major supplier of wafers, cells and modules to the PV solar industry. The Group is also involved in developing PV systems. The Group headquarters are located in Sandvika, outside Oslo, Norway.

REC's business structure comprises the three business segments REC Silicon, REC Wafer, and REC Solar. Production was in 2011 carried out in the following subsidiaries; REC Solar Grade Silicon LLC and REC Advanced Silicon Materials LLC in the US, REC Wafer Norway AS, REC ScanCell AS in Norway (closed down at the end of 2011) and REC Wafer Pte Ltd, REC Cells Pte Ltd, and REC Modules Pte Ltd in Singapore. REC's sales and marketing activities in modules, systems integration and project development are handled by local subsidiaries in Germany, Italy, France, Spain, the US and Singapore.

0.2

Reporting Year

Please state the start and end date of the year for which you are reporting data.

The current reporting year is the latest/most recent 12-month period for which data is reported. Enter the dates of this year first.

We request data for more than one reporting period for some emission accounting questions. Please provide data for the three years prior to the current reporting year if you have not provided this information before, or if this is the first time you have answered a CDP information request. (This does not apply if you have been offered and selected the option of answering the shorter questionnaire). If you are going to provide additional years of data, please give the dates of those reporting periods here. Work backwards from the most recent reporting year.

Please enter dates in following format: day(DD)/month(MM)/year(YYYY) (i.e. 31/01/2001).

Enter Periods that will be disclosed

Sat 01 Jan 2011 - Sat 31 Dec 2011

0.3

Country list configuration

Please select the countries for which you will be supplying data. This selection will be carried forward to assist you in completing your response

Select country
Norway
Singapore
United States of America
Germany
Italy
France
Spain

0.4

Currency selection

Please select the currency in which you would like to submit your response. All financial information contained in the response should be in this currency.

NOK

0.5

Please select if you wish to complete a shorter information request

0.6

Modules

As part of the Investor CDP information request, electric utilities, companies with electric utility activities or assets, companies in the automobile or auto component manufacture sectors and companies in the oil and gas industry should complete supplementary questions in addition to the main questionnaire.

If you are in these sectors (according to the Global Industry Classification Standard (GICS)), the corresponding sector modules will be marked as default options to your information request. If you want to query your classification, please email respond@cdproject.net.

If you have not been presented with a sector module that you consider would be appropriate for your company to answer, please select the module below. If you wish to view the questions first, please see <https://www.cdproject.net/en-US/Programmes/Pages/More-questionnaires.aspx>.

Module: Management [Investor]

Page: 1. Governance

1.1

Where is the highest level of direct responsibility for climate change within your company?

Individual/Sub-set of the Board or other committee appointed by the Board

1.1a

Please identify the position of the individual or name of the committee with this responsibility

Chairman of the Board and the Board of Directors

1.2

Do you provide incentives for the management of climate change issues, including the attainment of targets?

Yes

1.2a

Please complete the table

Who is entitled to benefit from these incentives?	The type of incentives	Incentivised performance indicator
All employees	Monetary reward	Reductions in manufacturing costs (which reduces the costs of the solar modules to make them more competitive with other technologies)
Management group	Monetary reward	Reductions in manufacturing costs (which reduces the costs of the solar modules to make them more competitive with other technologies)
Management group	Monetary reward	Optimisation of production to achieve improved production stability
Management group	Monetary reward	Improvements in production efficiency (which contributes to reduce the energy payback time and the carbon footprint)
Management group	Monetary reward	Expansion of FBR polysilicon capacity (Production of FBR polysilicon is 75% more energy efficient than conventional production technology and reduces therefore the solar modules' carbon footprint significantly)
Management group	Monetary reward	Expanded PV markets (which contributes to increase the displacement of electricity generation by fossil fuels with PV)
Corporate executive team	Monetary reward	Reductions in manufacturing costs of silicon, wafers, cells and modules (which reduces the total costs of the solar modules to make them more competitive with other technologies)
Corporate executive team	Monetary reward	Improvements in cell efficiency (which contributes to reduce the energy payback time and the carbon footprint)
Corporate executive team	Monetary reward	Increase solar efficiency of cells and modules (which contributes to reduce the energy payback time and the carbon footprint)

Page: 2. Strategy

2.1

Please select the option that best describes your risk management procedures with regard to climate change risks and opportunities

Integrated into multi-disciplinary company wide risk management processes

2.1a

Please provide further details (see guidance)

Global energy demand is expected to continue to increase over the coming years, and the climate change problems are still escalating. The world needs to promote sustainable alternatives to traditional energy sources, as the UN expects a quadrupling of annual carbon emissions in the 21st century unless active climate policies are quickly implemented. REC believes reduced cost, attractive carbon footprint and declining energy pay-back time will make solar energy an essential part of the future global electricity generation mix.

The company's mission statement "Smart Energy for a Cleaner Future" signals REC's commitment to play a leading role in the development of a sustainable energy market, and REC's vision is to become one of the world's leading providers of competitive solar energy solutions. To realize this vision, REC will seek to advance the competitiveness of solar energy and create value through innovation, operational excellence, and industry-wide expertise.

REC has over the last few years been through a phase of construction and ramp up of significant new production capacity, mainly in the US and in Singapore. REC continues to focus on cost reductions, further optimization of our assets and improved product quality. In 2012 REC will make investments in implementation of technology to improve product performance and reliability, and REC will seek to build brand identity and strengthen the market organization, both in Europe, Asia and the US.

Sustainability is an integral part of the strategy of REC. By making solar panels clean and affordable globally, REC makes an important contribution to mitigate climate change. The strategy also involves maximizing the energy efficiency of its products, minimizing negative environmental impacts, and preventing pollution from all business activities and products. Both REC and the solar industry in general depend on the safety and sustainability of PV products.

The REC group has an overall risk management process to identify a broad range of risks and also those related to climate change and environmental issues. REC has a risk management system to ensure that all business segments within the REC Group have a systematic and uniform approach to risk management.

Within the system, the roles, responsibilities, processes and procedures, standards, tools, facilities and documentation to be produced are defined. Group Management sets the context in which risks are managed, i.e. how risks are to be identified, analyzed, controlled, monitored and reviewed. It also supervises the risk management process, however the business segments are the "riskowners" and responsible for ensuring that risk management is a systematic, integrated part of their day-to-day operations. Each business segment defines and analyzes risks in order to establish or update its risks picture through a bottom-up process. In addition, each segment must carry out a top-down analysis. Each segment reports a risk picture (top ten per segment area) every year as an integrated part of the planning process as well as an update in connection with the quarterly reporting. REC Group Management performs a separate and additional risk evaluation based on a top-down approach. The quarterly risk assessment is presented to the Board of Directors.

In addition, REC Group Management generates monthly reports that are sent to the Board of Directors including operational reviews, HSE (Health, Safety and Environment), financial highlights and key performance indicators. REC Group Management also submits quarterly sustainability reports to the Board of Directors.

In order to minimize sustainability risks, REC has developed and implemented an HSE management system consisting of 14 HSE principles, including e.g. environmental management, risk management and product stewardship. Within each principle it is described how to achieve world class standards that will overall contribute to minimizing environmental and social risks throughout the lifecycle of our products. Each unit is assessed annually according to these standards and results are reported to the Group management and the Board of Directors, in addition to statistics on safety and environmental parameters. In this way, REC can identify and detect risks in a precautionary manner and act accordingly.

2.2

Is climate change integrated into your business strategy?

Yes

Please describe the process and outcomes (see guidance)

The link between climate change and business strategy is stronger with REC and solar industry than with other industries. By making solar panels clean and affordable globally, REC makes an important contribution to mitigate climate change. The strategy involves maximizing the energy efficiency of its products, minimizing negative environmental impacts, and preventing pollution from all business activities and products. Both REC and the solar industry in general depend on the safety and sustainability of PV products.

Cost reductions

Back in 2005 REC defined a cost roadmap to halve the production costs of solar panels by 2010, and this was achieved. Increased competitive pressure and reduced support from policy makers (in particular in Europe), made it necessary for REC to accelerate cost reductions over the last couple of years. Therefore, from 2010 to 2011 the production cost was reduced by approximately 30 percent and cost is expected to be reduced by another 30 percent in 2012. The cost reductions includes improved solar output and efficiency from the end products, establishing of new and improved production methods, improved sourcing and reduced use of polysilicon, glass, aluminum and other materials in the end products. REC is continuously working on improving design to use less material, to improve output and to reduce cost per unit. The result of the significant cost reduction is that solar now is competitive with other conventional sources of electricity in the residential and commercial segments in the sun rich regions of the world.

EPBT, LCA & emissions

In addition to the cost reduction program, REC aims to achieve an energy payback time (EPBT) of one year for the REC solar panels. The EPBT is defined as the time required for the module to generate as much energy as cumulated energy demand in the entire module production. REC has carried out LCA (Life Cycle Analysis) studies for the products in order to map average carbon footprint in the lifecycle of the products. The LCA-results have subsequently been compared with the carbon intensity in the grid. A Life Cycle Assessment (LCA) study was undertaken in 2011 based on production data from the first quarter of the year. The LCA, conducted independently by the Energy Research Centre of the Netherlands (ECN), calculated the carbon footprint and the energy payback time. For polysilicon produced in the US, and for wafers, cells and modules produced in Singapore, a carbon footprint of 21 g CO₂-eq/kWh with a corresponding energy payback time of 1.2 years was achieved. For modules with wafers and cells produced in Norway, the corresponding values were 18 g CO₂-eq/kWh and an energy payback time of 1.1 years. Modules containing 100% silicon produced using the proprietary Fluidized Bed Reactor technology, have an energy payback time of 1.0 years. To ensure REC has a minimal impact on the environment, efforts are continually made to reduce energy use and carbon emissions. Wherever possible, REC uses low-carbon energy sources such as hydroelectric power in Norway, natural gas power in Singapore and natural gas and hydroelectricity in the United States. In Singapore, there has been a strong commitment to save energy with a site goal to reduce the effect usage by 7 percent from 2010 to 2011. More than 20 initiatives were identified to achieve this goal, including minor adjustments and larger operational changes.

R&D

REC has focused on research and development and this has been very important for the development of the next generation products. One of the important outcomes from the R&D efforts has been the development of the FBR (Fluidized Bed Reactor) technology where REC has obtained several patents. This technology has 75 percent lower energy use for the production process of polysilicon compared to the conventional Siemens process. Today, 70 percent of REC polysilicon production is based on the FBR technology meanwhile all business expansion and unit upgrading will adopt the FBR technology, thus rendering an ever increasing share. REC is also working on a second generation of FBR technology to improve product performance and reduce

cost.

Material and waste management

An important aspect of REC's environment & climate policy is material and waste management. To minimize resource consumption contributes significantly to reducing the carbon footprint of solar modules. REC continually investigates opportunities to enhance level of material reuse and recycling with its design and production processes. Throughout the product design process, REC works to reduce material and packaging, without compromising on quality. Another aspect is the waste handling process, where REC continually works to reduce the amount of waste as well as enhancing the portion that goes to recycling. In general waste from the manufacturing processes is sorted and recycled to a high degree with third party waste management facilities. In 2011, REC sent over 6,000 tonnes of material for recycling.

2.2b

Please explain why not

2.3

Do you engage with policy makers to encourage further action on mitigation and/or adaptation ?

Yes

2.3a

Please explain (i) the engagement process and (ii) actions you are advocating

Primarily REC engages policymakers through sector organizations for the solar industry. REC is an active member of SEIA (Solar Energy Industry Association) in the US and EPIA (European Photovoltaic Industry Association) in Europe, where we participate in several of the working groups, e.g. the Policy working group and the Sustainability Development working group. Through these memberships, we contribute to the development of predictable, sustainable and just frame conditions for solar energy as well as monitor legislation that affects the solar industry. REC is also supporting Beilona (a Norwegian NGO), in their work to strive for increased use of solar energy, through influence on political energy and climate processes. REC also engages policymakers through participating on events such as the Zero conference and presentations for politicians and bureaucrats.

3.1

Did you have an emissions reduction target that was active (ongoing or reached completion) in the reporting year?

Intensity target

3.1a

Please provide details of your absolute target

ID	Scope	% of emissions in scope	% reduction from base year	Base year	Base year emissions (metric tonnes CO2e)	Target year	Comment

3.1b

Please provide details of your intensity target

ID	Scope	% of emissions in scope	% reduction from base year	Metric	Base year	Normalized base year emissions	Target year	Comment
S1	Scope 2	22%	29%	metric tonnes CO2e per unit of production	2010	0.0608	2011	S1 refers to REC Solar in Singapore. The unit of production is number of modules produced. There was no long term target but only on a one year basis for the purpose of optimising the production after ramp up of the plants. The target was achieved

ID	Scope	% of emissions in scope	% reduction from base year	Metric	Base year	Normalized base year emissions	Target year	Comment
								through several optimisation initiatives, among them an energy saving program. At the end of the year, the intensity was reduced to 0.0431 MT CO2e/module.

3.1c

Please also indicate what change in absolute emissions this intensity target reflects

ID	Direction of change anticipated in absolute Scope 1+2 emissions at target completion?	% change anticipated in absolute Scope 1+2 emissions	Direction of change anticipated in absolute Scope 3 emissions at target completion?	% change anticipated in absolute Scope 3 emissions	Comments
S1	Increase	27	No change	0	The emissions intensity was reduced with 29% at the same time as the production volume increased by 79% (REC Solar in Singapore). The increased production caused the absolute emissions to increase, but not as much as it would have without the energy saving program. The total change in Singapore was thus an increase of 27%.

3.1d

Please provide details on your progress against this target made in the reporting year

ID	% complete (time)	% complete (emissions)	Comment
S1	100	100	See 3.1.b. The target, which was a short term target for 2011, was achieved through several optimisation initiatives, among them an energy saving program.

3.1e

Please explain (i) why not; and (ii) forecast how your emissions will change over the next five years

3.2

Does the use of your goods and/or services directly enable GHG emissions to be avoided by a third party?

Yes

3.2a

Please provide details (see guidance)

The REC group produces solar technology products with significantly lower CO2 emissions compared to all fossil based energy types. REC products lay at the lower end also of renewable energy systems in terms of carbon intensity (about 20 g/kWh). Hence, REC products have substantially lower carbon intensity than any grid average in any region of the world and thus the introduction of REC products directly imply a reduction in average CO2 emissions from the grid. CO2 emissions are avoided by the products being installed and used for energy generation. The more solar power that is installed (replacing fossile sources) for energy generation, the more CO2 emissions are avoided.

Solar technology can be used by private consumers, businesses, local governments and energy providers. In the future solar technology will be one of the sources that enables anyone to produce environmentally friendly power, for covering their own needs or for generation to the grid.

In 2011, REC produced polysilicon, wafers and modules representing an installed total PV capacity of 2713 MW. Assuming world-wide irradiance and grid electricity emissions as well as an annual linear degradation of the modules' power output, we conservatively estimate that our 2011 products are being used to displace more than 1,600,000 MTCO2e per year for the 25+ year product life.

Since REC began commercial operation in 2006 and through 2011, REC has produced PV modules, wafers and polysilicon representing a total installed PV capacity of approximately 6500 MW, which is estimated to displace around 3,880,000 MT CO2e in average per year for their 25+ year product life.

The estimated carbon displacement is based on average annual electricity output over 25 year project lifetime with 0,7% linear annual degradation, performance factor of 80%, and the following global average assumptions:

- 1) Irradiance – world average value of 1617 kWh/m2-yr over 1983-2005; excluding latitudes within the Arctic and Antarctic circles; NASA Surface meteorology and Solar Energy (SSE) Release 6.0 Data Set (Jan 2008); <http://eosweb.larc.nasa.gov/sse/>
- 2) Electricity generation CO2 emissions intensity – world average value of 502 g CO2/kWh in 2008 for all generation sources from IEA

(<http://www.iea.org/co2highlights/>)

REC group has not yet considered originating credits according to CDM or JI. REC produces solar technology products for sale and installation by their clients. REC is not an energy provider.

The installation of REC products can however enable REC clients to originate CDM or JI carbon credits.

3.3

Did you have emissions reduction initiatives that were active within the reporting year (this can include those in the planning and/or implementation phases)

Yes

3.3a

Please identify the total number of projects at each stage of development, and for those in the implementation stages, estimated CO2e savings

Stage of development	Number of projects	Total estimated annual CO2e savings (only for rows marked *)
Under investigation		
To be implemented*		
Implementation commenced*		
Implemented*	1	7544
Not to be implemented		

3.3b

For those initiatives implemented in the reporting year, please provide details in the table below

Activity type	Description of activity	Estimated annual CO2e savings	Annual monetary savings (unit currency)	Investment required (unit currency)	Payback period
Energy efficiency: processes	At the Singapore site it was in Aug 2010 established a voluntary energy saving program to reduce the scope 2 emissions (electricity usage) and reduce costs within the time frame of 2011. The program consisted of many smaller and some larger operational adjustments such as: Reducing number of compressors, reducing supply pressure, reduce cooling of process water, lighting reduction, process optimisation, reduction in cooling water consumption etc. The strategy of the program was to avoid any capex, and get vendors to pay for any new installations and share the savings with them. The target of the energy saving program was to reduce the effect usage on a monthly basis with 7% compared to baseline that was set in Aug 2010. This was gradually achieved during the year of 2011, and the 7% reduction was sustained through the last 4 months of 2011. Thus the total effect reduction for 2011 amounts up to 5242 t avoided CO2 emissions. If one had a constant effect reduction of 7% compared to baseline in 2010 throughout a whole year, this would lead to an annual avoidance of 7544 t CO2e, with the estimated annual cost savings of 16,2 MNOK.	7544	16200000	0	<1 year

3.3c

What methods do you use to drive investment in emissions reduction activities?

Method	Comment
Financial optimization calculations	Investments in emission reduction activities will be made if there is also a cost saving potential in order to both reduce the carbon footprint as well as make solar modules more affordable to the customers.

3.3d

If you do not have any emissions reduction initiatives, please explain why not

4.1

Have you published information about your company's response to climate change and GHG emissions performance for this reporting year in other places than in your CDP response? If so, please attach the publication(s)

Publication	Page/Section Reference	Identify the attachment
In annual reports (complete)	Page 21-23 and Page 35 - 46	Annual report 2011
In voluntary communications (complete)	Page 1 - 22	Sustainability report 2011
In voluntary communications (complete)	Page 1-6	Life Cycle Assessment

Attachments

<https://www.cdproject.net/Sites/2012/35/23135/Investor CDP 2012/Shared Documents/Attachments/InvestorCDP2012/4.Communication/REC annual report 2011 web.pdf>
https://www.cdproject.net/Sites/2012/35/23135/Investor CDP 2012/Shared Documents/Attachments/InvestorCDP 2012/Shared Documents/Attachments/InvestorCDP 2012/Shared Documents/Attachments/InvestorCDP2012/4.Communication/LCA_brochure_020911_web.pdf

5.1

Have you identified any climate change risks (current or future) that have potential to generate a substantive change in your business operations, revenue or expenditure? Tick all that apply

Risks driven by changes in regulation

Risks driven by changes in physical climate parameters

5.1a

Please describe your risks driven by changes in regulation

ID	Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact
Regul	Lack of regulation	There is a risk of reduced support and lack of policies promoting renewable energy sources (including solar). These policies include carbon taxes, feed-in tariffs for renewables etc. Stricter regulation to mitigate climate change represents an opportunity for REC (see opportunity section).	Reduced demand for goods/services	1-5 years	Direct	More likely than not	High

5.1b

Please describe (i) the potential financial implications of the risk before taking action; (ii) the methods you are using to manage this risk; and (iii) the costs associated with these actions

Adverse development in relation to regulations promoting renewables (including solar) can have severe negative financial impact on REC through reduced demand for our products and lower pricing.

Germany and Italy represented 55 percent global solar module demand in 2011. Further reductions of the subsidy schemes and other adverse changes in regulations, in these and other markets may reduce demand for PV components. Changing regulations, mainly in Europe, led to overcapacity in the solar industry in 2011 and caused prices to drop by 50-70% on REC products.

REC is engaged with policy makers in key solar markets directly and through industry associations to influence solar/renewable policies and regulations. Through

this dialogue REC is also able to stay informed on potential policy changes that may affect demand for our products. REC mitigates these risks through active development of our market position in emerging markets to broaden the basis for demand for our products.

There are limited costs associated with these activities.

5.1c

Please describe your risks that are driven by change in physical climate parameters

ID	Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact
Physi	Other physical climate drivers	Risk related to impact of climate change and extreme weather conditions. Risks include changes in precipitation, droughts, rising sea levels and storms/hurricanes	Increased operational cost	1-5 years	Direct	Unknown	Medium-high

5.1d

Please describe (i) the potential financial implications of the risk before taking action; (ii) the methods you are using to manage this risk; and (iii) the costs associated with these actions

Severe weather conditions may cause damage on RECs production facilities may also interrupt production, and may increase cost of operations. REC has a production facility in Singapore as well as REC Headquarter located in Sandvika, Norway both located near the sea and these can in the long term be affected by rising sea levels. For RECs customers, increased frequency of storms and extreme weather conditions can lower output from the solar panels and may reduce the value of REC products. Extreme weather may also increase the cost of transportation and logistics.

Please note that severe negative impact of climate change is likely to drive stricter regulation on carbon emissions and further promote the use of renewables. This would rather represent an opportunity for RECs solar products (see opportunity section).

REC partly mitigates these risks through insurance covering the most common extreme weather events and production interruptions. However normal insurance coverage would not provide complete financial cover and would typically involve deductibles etc.

5.1e

Please describe your risks that are driven by changes in other climate-related developments

ID	Risk driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact

5.1f

Please describe (i) the potential financial implications of the risk before taking action; (ii) the methods you are using to manage this risk; (iii) the costs associated with these actions

5.1g

Please explain why you do not consider your company to be exposed to risks driven by changes in regulation that have the potential to generate a substantive change in your business operations, revenue or expenditure

5.1h

Please explain why you do not consider your company to be exposed to risks driven by physical climate parameters that have the potential to generate a substantive change in your business operations, revenue or expenditure

5.1i

Please explain why you do not consider your company to be exposed to risks driven by changes in other climate-related developments that have the potential to generate a substantive change in your business operations, revenue or expenditure

No other climate-related risks have been identified.
 Please note that severe negative impact of climate change is likely to drive stricter regulation on carbon emissions and further promote the use of renewables. This would rather represent an opportunity for REC's solar products (see opportunity section).

Page: 2012-Investor-Risks&Opps-ClimateChangeOpp

6.1

Have you identified any climate change opportunities (current or future) that have the potential to generate a substantive change in your business operations, revenue or expenditure? Tick all that apply

Opportunities driven by changes in regulation
 Opportunities driven by changes in physical climate parameters

6.1a

Please describe your opportunities that are driven by changes in regulation

ID	Opportunity driver	Description	Potential impact	Timeframe	Direct/Indirect	Likelihood	Magnitude of impact
Regul	Other regulatory drivers	Increased awareness and focus on the issue of climate change and the continued cost reductions for solar, is likely to provide a basis for increased support for the use of solar energy. This represents a significant opportunity for REC and the solar industry.	Increased demand for existing products/services	1-5 years	Direct	More likely than not	Medium-high

6.1b

Please describe (i) the potential financial implications of the opportunity; (ii) the methods you are using to manage this opportunity; (iii) the costs associated with these actions

Strengthening of policy support for solar and renewables globally will increase demand for REC products and provides opportunities for maintaining a long term sustainable pricing of our products.

Further progress on the international negotiations on commitments to reduce global carbon emissions and introduction a carbon tax would represent a great opportunity for solar and for REC.

In 2012 we see increased support for solar globally but in particular in Japan, China and India.

REC is engaged with policy makers in key solar markets directly and through industry associations to influence solar/renewable policies and regulations. Through this dialogue REC is also able to stay informed on potential policy changes that may affect demand for our products.

REC is continuously assessing which markets to enter with the basis in the forecasted demand potential. REC strives to capture new market opportunities by deploying our resources, insights in the PV market fundamentals and by working together with local and regional partners.

6.1c

Please describe the opportunities that are driven by changes in physical climate parameters

ID	Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact
Physi	Other physical climate opportunities	Opportunities related to impact of climate change and extreme weather conditions, and the expected increased support for initiatives to reduce carbon emissions through i.e. adaption of solar energy technologies.	Increased demand for existing products/services	1-5 years	Indirect (Client)	Likely	Medium-high

6.1d

Please describe (i) the potential financial implications of the opportunity; (ii) the methods you are using to manage this opportunity; (iii) the costs associated with these actions

Strengthening of policy support for solar and renewables globally will increase demand for REC products and provides opportunities for maintaining a long term sustainable pricing of our products. Further progress on the international negotiations on commitments to reduce global carbon emissions and introduction a carbon tax would represent a great opportunity for solar and for REC.

In 2012 we see increased support for solar globally but in particular in Japan, China and India.

REC is engaged with policy makers in key solar markets directly and through industry associations to influence solar/renewable policies and regulations. Through this dialogue REC is also able to stay informed on potential policy changes that may affect demand for our products.

6.1e

Please describe the opportunities that are driven by changes in other climate-related developments

ID	Opportunity driver	Description	Potential impact	Timeframe	Direct/ Indirect	Likelihood	Magnitude of impact

6.1f

Please describe (i) the potential financial implications of the opportunity; (ii) the methods you are using to manage this opportunity; (iii) the costs associated with these actions

6.1g

Please explain why you do not consider your company to be exposed to opportunities driven by changes in regulation that have the potential to generate a substantive change in your business operations, revenue or expenditure

6.1h

Please explain why you do not consider your company to be exposed to opportunities driven by physical climate parameters that have the potential to generate a substantive change in your business operations, revenue or expenditure

6.1i

Please explain why you do not consider your company to be exposed to opportunities driven by changes in other climate-related developments that have the potential to generate a substantive change in your business operations, revenue or expenditure

No other climate-related opportunities have been identified.

Module: GHG Emissions Accounting, Energy and Fuel Use, and Trading [Investor]

Page: 7. Emissions Methodology

7.1

Please provide your base year and base year emissions (Scopes 1 and 2)

Base year	Scope 1 Base year emissions (metric tonnes CO2e)	Scope 2 Base year emissions (metric tonnes CO2e)
Fri 01 Jan 2010 - Fri 31 Dec 2010	91456	412679.2

Base year	Scope 1 Base year emissions (metric tonnes CO2e)	Scope 2 Base year emissions (metric tonnes CO2e)

7.2

Please give the name of the standard, protocol or methodology you have used to collect activity data and calculate Scope 1 and Scope 2 emissions

Please select the published methodologies that you use

The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition)

7.2a

If you have selected "Other", please provide details below

7.3

Please give the source for the global warming potentials you have used

Gas	Reference
CH4	IPCC Second Assessment Report (SAR - 100 year)
N2O	IPCC Second Assessment Report (SAR - 100 year)
CO2	IPCC Second Assessment Report (SAR - 100 year)

7.4

Please give the emissions factors you have applied and their origin; alternatively, please attach an Excel spreadsheet with this data

Fuel/Material/Energy	Emission Factor	Unit	Reference
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Attachments

https://www.cdproject.net/Sites/2012/35/23135/Investor CDP 2012/Shared Documents/Attachments/InvestorCDP2012/7. EmissionsMethodology/Worksheet-to-input-of-Emission factors_REC.xlsx

Page: 8. Emissions Data - (1 Jan 2011 - 31 Dec 2011)

8.1

Please select the boundary you are using for your Scope 1 and 2 greenhouse gas inventory

Operational control

8.2a

Please provide your gross global Scope 1 emissions figure in metric tonnes CO₂e

211423.9

8.2b

Please provide your gross global Scope 1 emissions figures in metric tonnes CO₂e - Part 1 breakdown

Boundary	Gross global Scope 1 emissions (metric tonnes CO2e)	Comment
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8.2c

Please provide your gross global Scope 1 emissions figures in metric tonnes CO2e - Part 1 Total

Gross global Scope 1 emissions (metric tonnes CO2e) – Part 1 Total	Comment
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8.2d

Please provide your gross global Scope 1 emissions figures in metric tonnes CO2e - Part 2

Boundary	Gross global Scope 1 emissions (metric tonnes CO2e)	Comment
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8.3a

Please provide your gross global Scope 2 emissions figure in metric tonnes CO2e

462328.2

8.3b

Please provide your gross global Scope 2 emissions figures in metric tonnes CO2e - Part 1 breakdown

Boundary	Gross global Scope 2 emissions (metric tonnes CO2e)	Comment
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8.3c

Please provide your gross global Scope 2 emissions figures in metric tonnes CO2e - Part 1 Total

Gross global Scope 2 emissions (metric tonnes CO2e) - Total Part 1	Comment
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8.3d

Please provide your gross global Scope 2 emissions figures in metric tonnes CO2e - Part 2

Boundary	Gross global Scope 2 emissions (metric tonnes CO2e) - Other operationally controlled entities, activities or facilities	Comment
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8.4

Are there any sources (e.g. facilities, specific GHGs, activities, geographies, etc.) of Scope 1 and Scope 2 emissions which are not included in your disclosure?

8.4a

Please complete the table

Reporting Entity	Source	Scope	Explain why the source is excluded
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8.4

Are there any sources (e.g. facilities, specific GHGs, activities, geographies, etc.) of Scope 1 and Scope 2 emissions which are not included in your disclosure?

Yes

8.4a

Please complete the table

Source	Scope	Explain why the source is excluded
Gas usage for office heating and cooling, for some offices	Scope 1	Data difficult to obtain. Very minor source.
Fuel usage for company cars and vehicles for some locations	Scope 1	Data difficult to obtain. Minor source.
Electricity for office location in some countries (US, Taiwan, Japan, China)	Scope 2	Data difficult to obtain. Minor source.

8.5

Please estimate the level of uncertainty of the total gross global Scope 1 and Scope 2 figures that you have supplied and specify the sources of uncertainty in your data gathering, handling, and calculations

Scope 1 emissions: Uncertainty range	Scope 1 emissions: Main sources of uncertainty	Scope 1 emissions: Please expand on the uncertainty in your data	Scope 2 emissions: Uncertainty range	Scope 2 emissions: Main sources of uncertainty	Scope 2 emissions: Please expand on the uncertainty in your data
Less than or equal to 2%	Data Gaps	Missing data from minor sources such as company cars and vehicles	Less than or equal to 2%	Data Gaps	Missing data from minor sources such as electricity consumption at very small office locations (sales offices with 1-5 people) in US, and Asia
Less than or equal to 2%	Metering/ Measurement Constraints Data Management	We assume that there will always be some uncertainty in the reported figures.	Less than or equal to 2%	Metering/ Measurement Constraints Data Management	We assume that there will always be some uncertainty in the reported figures.

8.6

Please indicate the verification/assurance status that applies to your Scope 1 emissions

Verification or assurance complete

8.6a

Please indicate the proportion of your Scope 1 emissions that are verified/assured

More than 90% but less than or equal to 100%

8.6b

Please provide further details of the verification/assurance undertaken, and attach the relevant statements

Level of verification or assurance	Relevant verification standard	Relevant statement attached
Limited assurance	ISO 14064-3	Verification statement by CO2focus attached

8.7

Please indicate the verification/assurance status that applies to your Scope 2 emissions

Verification or assurance complete

8.7a

Please indicate the proportion of your Scope 2 emissions that are verified/assured

More than 90% but less than or equal to 100%

8.7b

Please provide further details of the verification/assurance undertaken, and attach the relevant statements

Level of verification or assurance	Relevant verification standard	Relevant statement attached
Limited assurance	ISO 14064-3	Verification statement by CO2focus

Level of verification or assurance	Relevant verification standard	Relevant statement attached
		attached

8.8

Are carbon dioxide emissions from the combustion of biologically sequestered carbon (i.e. carbon dioxide emissions from burning biomass/biofuels) relevant to your company?

No

8.8a

Please provide the emissions in metric tonnes CO2e

Attachments

[https://www.cdproject.net/Sites/2012/35/23135/Investor CDP 2012/Shared Documents/Attachments/InvestorCDP2012/8.EmissionsData\(1Jan2011-31Dec2011\)/GHG Verification statement_2012 REC Group.pdf](https://www.cdproject.net/Sites/2012/35/23135/Investor%20CDP%202012/Shared%20Documents/Attachments/InvestorCDP2012/8.EmissionsData(1Jan2011-31Dec2011)/GHG%20Verification%20statement_2012%20REC%20Group.pdf)

Page: 9. Scope 1 Emissions Breakdown - (1 Jan 2011 - 31 Dec 2011)

9.1

Do you have Scope 1 emissions sources in more than one country or region (if covered by emissions regulation at a regional level)?

Yes

9.1a

Please complete the table below

Country	Scope 1 metric tonnes CO2e
Norway	11.4
Other: US	211208.4
Other: Singapore	45.5
Other: Europe	158.5
Other: Asia	0

9.2

Please indicate which other Scope 1 emissions breakdowns you are able to provide (tick all that apply)

By business division

9.2a

Please break down your total gross global Scope 1 emissions by business division

Business Division	Scope 1 metric tonnes CO2e
REC Silicon	211203.3
REC Wafer	0
REC Solar	209.5
REC ASA	11.1

9.2b

Please break down your total gross global Scope 1 emissions by facility

Facility	Scope 1 metric tonnes CO2e
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9.2c

Please break down your total gross global Scope 1 emissions by GHG type

GHG type	Scope 1 metric tonnes CO2e
----------	----------------------------

9.2d

Please break down your total gross global Scope 1 emissions by activity

Activity	Scope 1 metric tonnes CO2e
----------	----------------------------

10.1

Do you have Scope 2 emissions sources in more than one country or region (if covered by emissions regulation at a regional level)?

Yes

10.1a

Please complete the table below

Country	Scope 2 metric tonnes CO2e
Norway	32955.1
Other: US	313187.4
Other: Singapore	116166.4
Other: Europe	19.2
Other: Asia	0

10.2

Please indicate which other Scope 2 emissions breakdowns you are able to provide (tick all that apply)

By business division

10.2a

Please break down your total gross global Scope 2 emissions by business division

Business division	Scope 2 metric tonnes CO2e
REC Silicon	313186
REC Wafer	30931.7
REC Solar	118079.9
REC ASA	130.6

10.2b

Please break down your total gross global Scope 2 emissions by facility

Facility	Scope 2 metric tonnes CO2e
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10.2c

Please break down your total gross global Scope 2 emissions by activity

Activity	Scope 2 metric tonnes CO2e
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Page: 11. Emissions Scope 2 Contractual

11.1

Do you consider that the grid average factors used to report Scope 2 emissions in Question 8.3 reflect the contractual arrangements you have with electricity suppliers?

Yes

11.1a

You may report a total contractual Scope 2 figure in response to this question. Please provide your total global contractual Scope 2 GHG emissions figure in metric tonnes CO2e

11.1b

Explain the basis of the alternative figure (see guidance)

11.2

Has your organization retired any certificates, e.g. Renewable Energy Certificates, associated with zero or low carbon electricity within the reporting year or has this been done on your behalf?

No

11.2a

Please provide details including the number and type of certificates

Type of certificate	Number of certificates	Comments

Page: 12. Energy

12.1

What percentage of your total operational spend in the reporting year was on energy?

More than 5% but less than or equal to 10%

12.2

Please state how much fuel, electricity, heat, steam, and cooling in MWh your organization has consumed during the reporting year

Energy type	MWh
Fuel	1034911.7
Electricity	2099458.4
Heat	471.2
Steam	0

Energy type	MWh
Cooling	233

12.3

Please complete the table by breaking down the total "Fuel" figure entered above by fuel type

Fuels	MWh
Natural gas	1033383.9
Motor gasoline	128.1
Diesel/Gas oil	1399.7

Page: 13. Emissions Performance

13.1

How do your absolute emissions (Scope 1 and 2 combined) for the reporting year compare to the previous year?

Increased

13.1a

Please complete the table

Reason	Emissions value (percentage)	Direction of change	Comment
Emissions reduction	10.8	Decrease	There have been emission reduction activities in both Solar and Silicon division. REC Solar in Singapore, representing 17.2 % of REC total emissions, has achieved an intensity improvement of 29 % tCO ₂ e/MW

Reason	Emissions value (percentage)	Direction of change	Comment
activities			(corresponds with a total 53.5 % decrease) which results in an overall emission reduction for REC group of 9.4 % compared with case with no reduction activity. Please look at description of the activity in 3.1b (S1). This has been achieved through an energy consumption reduction program during 2011. The site in Singapore had an overall energy reduction target of 7 % related to the monthly effect usage, with baseline set at peak production after ramp up, in Aug 2010. This was achieved at the end of 2011. REC Silicon, representing 77.8 % of the total REC emissions, has achieved an intensity improvement of 1,3 % tCO2e/t polysilicon (corresponds with a total 1.8 % decrease) which results in an overall emission reduction (for REC group) of 1.4 %. The intensity improvement is due to an increased share of FBR technology for the silicon production.
Change in output	13.8	Increase	REC Solar in Singapore has increased its production volume (modules) with 79 % which relates to 13.8 % of an overall increase in emissions for REC. This is due to the ramp up of the site in Singapore, but at the same time the REC Solar facility ScanCell in Norway was shutdown in July 2011.
Change in output	30.6	Increase	REC Silicon has increased its production volume (polysilicon) with 39,4 % which results in 30.6 % of an overall emissions increase for REC. The increase is due to the expansion of the REC Silicon facilities in Butte and Moses Lake.
Other: Shutdown and change in output	0.4	Increase	REC Wafer Norway has reduced its production volume (wafers) with 11.2 % due to shutdown of capacity in second half of the year. The total emissions increased by 8.8 % which relates to 0.4 % of an overall increase for REC. REC Wafer Norway Glomfjord Multi was shut down in Aug 2011. REC Wafer Norway Herøya factory 1 and 2 was shut down in July 2011.

13.2

Please describe your gross combined Scope 1 and 2 emissions for the reporting year in metric tonnes CO2e per unit currency total revenue

Intensity figure	Metric numerator	Metric denominator	% change from previous year	Direction of change from previous year	Reason for Change
31	metric tonnes CO2e	unit total revenue	8.8	Increase	Total revenues decreased significantly in 2011 due to the falling product prices globally, in spite of increased production with 23 %.

13.3

Please describe your gross combined Scope 1 and 2 emissions for the reporting year in metric tonnes CO2e per full time equivalent (FTE) employee

Intensity figure	Metric numerator	Metric denominator	% change from previous year	Direction of change from previous year	Reason for Change
172.3	metric tonnes CO2e	FTE Employee	14.9	Increase	Number of employees decreased from 2010 until 2011 due to the shutdown of capacity as well as higher production capacity at other sites without increasing number of people.

13.4

Please provide an additional intensity (normalized) metric that is appropriate to your business operations

Intensity figure	Metric numerator	Metric denominator	% change from previous year	Direction of change from previous year	Reason for Change
137.7	metric tonnes CO2e	unit of production	8.7	Increase	The increase in CO2 emissions per produced unit (scope 1+2) is mainly due to shutdown of capacity in Norway, and a period with lower and thus unoptimal production in the Wafer segment.

Page: 14. Emissions Trading

14.1

Do you participate in any emission trading schemes?

No, and we do not currently anticipate doing so in the next two years

14.1a

Please complete the following table for each of the emission trading schemes in which you participate

Scheme name	Period for which data is supplied	Allowances allocated	Allowances purchased	Verified emissions in metric tonnes CO2e	Details of ownership
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14.1b

What is your strategy for complying with the schemes in which you participate or anticipate participating?

14.2

Has your company originated any project-based carbon credits or purchased any within the reporting period?

No

14.2a

Please complete the following table

Credit origination or credit purchase	Project type	Project identification	Verified to which standard	Number of credits (metric tonnes CO2e)	Number of credits (metric tonnes CO2e): Risk adjusted volume	Credits retired	Purpose e.g. compliance
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15.1

Please provide data on sources of Scope 3 emissions that are relevant to your organization

Sources of Scope 3 emissions	metric tonnes CO2e	Methodology	If you cannot provide a figure for emissions, please describe them
Business travel	4145.1	DEFRA emission factors (CO2e/pkm); a methodology mix of average distance times the number of trips and the actual distance travelled	
Downstream transportation and distribution	67416.7	Reports from transportation company with tkm data for Solar and Wafer. Silicon data was extracted from internal logistics reports. Emission factors (EF) were taken from transportation company where they were found reliable. Otherwise EFs from DEFRA were applied. These emissions cover in bound transport of main raw materials, intermediates between REC factories and transport/distribution of all products to customers (polysilicon, silane gases, wafers and modules).	

15.2

Please indicate the verification/assurance status that applies to your Scope 3 emissions

Verification or assurance complete

15.2a

Please indicate the proportion of your Scope 3 emissions that are verified/assured

More than 90% but less than or equal to 100%

15.2b

Please provide further details of the verification/assurance undertaken, and attach the relevant statements

Level of verification or assurance	Relevant verification standard	Relevant statement attached
Limited assurance	ISO14064-3	

15.3

Are you able to compare your Scope 3 emissions for the reporting year with those for the previous year for any sources?

No, this is our first year of estimation

15.3a

Please complete the table

Sources of Scope 3 emissions	Reason for change	Emissions value (percentage)	Direction of change	Comment

Attachments

https://www.cdproject.net/Sites/2012/35/23135/Investor CDP 2012/Shared Documents/Attachments/InvestorCDP2012/15.Scope3Emissions/GHG Verification statement_2012 REC Group.pdf

Module: Sign Off

Please enter the name of the individual that has signed off (approved) the response and their job title

Kjersti Langeland, HSE director REC ASA