

Collaborative Project



CLIM-RUN

Climate Local Information in the Mediterranean
region Responding to User Needs



WP 4 – Climate Services Pilot Case Studies
Task 4.1 CET and SET teams and Task 4.2 Case study implementation

Deliverable Title

Deliverable 4.1 – First workshops organization
“Workshops 1 planning and resource document”

Project No. 265192– CLIM-RUN

Start date of project: 1st March 2011

Duration: 36 months

Organization name of lead contractor for this deliverable: UEA

Due Date of Deliverable: month 6 (Aug 2011)

Version 1.1 29 July 2011

Version 1.2 22 November 2011

Actual Submission Date: November 2011

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1. Summary

This document provides a users' guide for organising the first round of CLIM-RUN stakeholder workshops. It hopefully provides a 'one-stop shop' for recommendations, information and resources for work and activities before, during and after the workshops. It has been produced by WP4, based on discussions with other WPs and the Executive Committee, and draws heavily on the early work done by WP7.

2. Workshop 1 spreadsheets

The following workshops have taken place:

- WP5
 - Tunisia 4 June 2011
 - Savoie 19 September 2011
 - Cyprus 31 October 2011
- WP6
 - Athens 28 September 2011
- WP7
 - Casablanca 4-5 May 2011
 - Madrid 11-13 May 2011
 - Barcelona 27 May 2011
 - Milan 7-9 June 2011
 - Zagreb 15 June 2011
 - London 4 July 2011
 - Cyprus 7 November 2011
- WP8
 - Venice 13 September 2011

Each WP (WP5 to WP8) is responsible for updating and maintaining the Workshop 1 spreadsheet. Please add preliminary information as soon as it is available, and continue to update it as more information becomes available during the planning period and after the workshops. The WP7 spreadsheet provides a good example of useful information to provide.

A spreadsheet has been set up (in egroupware FileManager /WP4/D4.1/) for each WP to edit and update. :

WP5 workshop spreadsheet
WP6 workshop spreadsheet
WP7 workshop spreadsheet
WP8 workshop spreadsheet

Amongst the information you need to provide in the spreadsheet is the name of the Climate and Stakeholder Experts assigned to each workshop. [WP2 experts](#)

The climate experts have given workshop presentations (some standard presentations are available as a starting point – see below – but can tailor presentations to specific workshops) and will also be involved in reviewing and ‘translating’ user needs – see ‘Presentations’ and ‘Next steps’ below.

3. CLIM-RUN web portal

This is the main CLIM-RUN web portal: <http://www.climrun.eu>

Please provide some information even if details are currently incomplete. Have a look at the Energy case-study for an example of additional information that could be added. Material for, and comments on, the web portal should be sent to: Emanuele Lombardi (emanuele.lombardi@enea.it).

Development of the CLIM-RUN web portal is a WP1 task (Task 1.2) and will be discussed during the WP1 meeting 6/7 December 2011. Contacts with stakeholders in the first months of CLIM-RUN have highlighted the importance of having an informative and useful web portal.

4. Involving stakeholders

The [draft CLIM-RUN protocol](#) produced by WP1 provides some useful background material on identifying and classifying stakeholders and will be further discussed during the WP1 December meeting.

The ‘Good practice checklist for facilitating stakeholder involvement in research projects’ based on the experience of the [CIRCE case studies](#) (see Appendix 1) may also provide some useful suggestions.

A [Powerpoint slide](#) lists some of the reasons for stakeholders to get involved in CLIM-RUN.

5. CLIM-RUN Key Stages

Appendix 2 lists the five Key Stages for the CLIM-RUN case-study work (these are consistent with the emerging CLIMRUN protocol). The first workshops contribute to 'Stage setting' and 'Mapping the issues'. Recommendations about moving on to 'Iterative consultation and collaboration' are provided below - see 'Next steps'. A simplified list of the Key Stages is available as a [Powerpoint slide](#).

6. Workshop 1 objectives

These are the [project-wide objectives](#) (written from the stakeholder perspective and consistent with the emerging CLIM-RUN protocol) for the first workshops:

- To present the CLIM-RUN project and the concept of climate services
- To provide an overview of state-of-the-art in climate modelling, observations and impacts analysis on seasonal/decadal/centennial timescales
- To better understand who are the climate services stakeholders
- To begin to define what you need/want from climate services
- To agree mechanisms for maintaining ongoing collaboration and interaction throughout CLIM-RUN

In addition, case-study and/or WP specific objectives, tailored to the particular focus and stakeholders have been defined for some of the workshops.

7. Circulating material in advance of the workshop

Here are some suggestions for material to send out to potential participants:

- Invitation letter
- (Draft) workshop programme
- Link to the CLIM-RUN web portal (see above)
- CLIM-RUN [poster](#) / [flyer](#)
- A project brochure (see this [example](#) from IC3)
- Part of the Perception Questionnaire (see below)

8. Workshop 1 approaches

The appropriate approach(es) depend on local circumstances including the number of participants and time available. Here are some that have been considered/used in CLIM-RUN:

- Presentations by researchers and stakeholders
- Roundtable discussion
- Break-out/brain-storming groups followed by a plenary round-up/summary session
- The [World Café](#) method for hosting large group dialogues
- Presentation of preliminary findings from the Perception Questionnaire (where circulated in advance)
- Time for completing parts of the Perception Questionnaire (see below)
- Consider providing a feedback questionnaire on the workshop itself (here is an [example](#))
- Allow time for discussing 'Next steps' – see below

9. Workshop 1 presentations

A number of sets of slides and complete Powerpoint presentations were produced following discussions at the CLIM-RUN kick-off meeting. Several of those listed below have been used in workshops. All of them are available from the CLIM-RUN wiki pages (WP7, WP5 and WP4), as well as in various people's Filemanager folders. The table below summarises what are likely to be the most useful slides. They provide a 'tool box' for creating presentations that are best suited to particular workshops (depending on time available, focus etc). For example, using the available slides on observations and modelling, together with additional examples (see below), the assigned climate experts should be able to produce tailored presentations for each workshop. A [template title page](#) is also available.

The CLIM-RUN Powerpoint Tool Box

General presentations	Topic(s)	Produced by	Language	No. Slides
CS 4 Action	Introduction to climate services and CLIM-RUN	Sandro Calmanti et al., WP7	English	20
CS Ivory Tower	Observations and modelling	Sandro Calmanti et al., WP7	English (a few slides in French)	27
Tunisia case study 4 June – see link on WP5 wiki (too	Introduction to climate services and CLIM-RUN	Adeline Cauchy, WP5	French	38

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long to link in here)	from tourism perspective			
Building blocks	Topic(s)	Produced by	Language	No. Slides
Stakeholders	Engaging stakeholders & workshop objectives	Clare Goodess	English	4
Cross sectoral impacts	Mediterranean wide impacts	Clare Goodess	English	4
Climate services	Mediterranean climate services	Nathalie Rousset and Sandro Calmanti	English	7
Present past data	Observations	Alessandro Dellaquila	English	6
Forecasting	Introduction to forecasting	Paco Doblas-Reyes, IC3	English	16
Modelisation long	Modelling including regionalisation	Samuel Somot and Clotilde Dubois (& will be two presentations also in French from 19 September Chambéry workshop)	French	42
Modelisation short	Modelling including regionalisation	Samuel Somot and Clotilde Dubois	French	12
CLIMRUN model	History of modelling	Gianmaria Sannino	English	19
List model	Models used in CLIM-RUN	Gianmaria Sannino	English	1
SDS long	Statistical downscaling portal - long	Dolores Frias	English	6
SDS short	Statistical downscaling portal – short	Dolores Frias	English	2
CS Ivory Tower long	Observations and modelling	Sandro Calmanti et al., WP7	English (a few slides in French)	36
CS 4 Action long	Introduction to climate services and CLIM-RUN	Sandro Calmanti et al., WP7	English	25
Temperature extremes	Observed and projected changes – from CIRCE	Richard Cornes and Clare Goodess	English	4

Tailored presentations	Topic(s)	Produced by	Language	No. Slides
Renewable energy - stakeholders	Climate prediction and renewable energy	Melanie Davis	English	24
Renewable energy – climate audience	Climate prediction and renewable energy	Melanie Davis	English	39
Climate on Cyprus	Current state and future projections	Panos Hadjinicolaou	English	50

A number of additional presentations relating to the Savoie WP5 workshop are available from the WP5 wiki and presentations from the WP5 and WP7 Cyprus workshops are available from [Dropbox](#).

10. Provision of examples from WP2 and WP3

From the experience of the first WP7 workshops and the WP5 view that stakeholders are more interested in the ‘what’ than the ‘how’, you may find it useful to have some relevant tailored examples of ‘products’ (e.g., maps/figures of forecasts/prediction/projections/observations for variables/indices, scales and applications likely to be of particular interest to your stakeholders). Examples could be for other regions but use methodologies/approaches potentially transferable to the Mediterranean. Such examples should help to give an idea of what can be produced (and it’s ‘skill’) and hence to engage stakeholders and focus discussion. But it is important that any examples are used consistently with the ‘bottom-up’ approach of CLIM-RUN and that discussion is not constrained to these examples.

One example that has been produced is this for [temperature extremes](#) based on earlier CIRCE work.

Please talk to your assigned climate experts and/or the WP2 (modelling) and WP3 (observations) leaders if you think such inputs for your workshop (or for follow-up activities) would be helpful. The workshop spreadsheets (see Section 2) also include a column for indicating such requests.

11. Perception Questionnaire

The CLIM-RUN [perception and data needs questionnaire](#) was developed by WP4 with input and feedback from other WPs. It is divided into the following sections:

- Your institution/organisation
- Risk perception and current use
- Your perspective on climate services
- Data requirements

- Handling uncertainties
- Glossary

It is designed to be flexible (as described further in the first 'Background' page, which is intended for researchers rather than respondents). Different parts can be circulated separately in advance of, during and after the workshops. WP7, for example, found the risk perception part initially most useful and in some cases the initial respondents suggested that more technical members of the organisation should subsequently complete the data requirements part (perhaps in one-to-one follow-up interviews).

A few of the questions (indicated by comments) need to be tailored for the particular WP/case study before circulation. You may also want to add some additional, specific questions of your own. And if you consider them inappropriate or that the questionnaire is too long, it is not essential to include all the current questions. You will likely also want to add your own front cover and will need to add information about returning the questionnaire (i.e., to whom and by when).

If more appropriate, parts of the questionnaire can also form the basis of semi-structured interviews with stakeholders – as done by WP7 and WP5. For WP7, the interviewer took notes during the interviews and subsequently completed the relevant parts of the questionnaire on behalf of the stakeholders.

It is planned to update the uncertainty section of the questionnaire. At the same time, Clare Goodess will draft a one page briefing note outlining the issues and including examples of some of the different ways of representing uncertainty (such as PDFs).

As well as the 'standard' version, the following tailored versions are available:

- A shorter/re-ordered/re-numbered version used for [WP7 interviews](#)
- [9 key questions](#) circulated by WP7
- A short-version used for the WP6 [Athens fires](#) workshop
- Several versions in French are available on the WP5 wiki, including a slightly-modified version of the original questionnaire used for the Tunisian workshop, and versions used in face-to-face interviews associated with the Savoie workshop.
- An online version (see Section 11.2) in Italian made available to stakeholders involved in the WP8 Venice workshop through the Google platform (add link when available).

11.1 Archiving the questionnaires

The questionnaires that have been completed so far are currently stored in various individual egrouppware folders and elsewhere. This makes it quite hard to find and view material.

This will allow all those who need access to find all the completed questionnaires fairly easily. WP1, for example, needs access for their work on stakeholder and institutional analysis (Task 1.1), WP2 and WP3 for looking at user requests in more details, and WP4 for synthesising results.

The final complete questionnaire is quite long (having seen the first draft people asked for more detail) and many of the questions have descriptive answers. And having reviewed the first returns, it is clear that people have skipped questions that they found difficult or irrelevant. So at this stage, it is not clear how much quantitative analysis will be possible. Moving to on-line questionnaires (see below) could, however, facilitate such analysis.

11.2 On-line questionnaires

It was suggested that an on-line version of the perception and data needs questionnaire should be developed (and WP1 Task 1.2 talks about on-line surveys and questionnaires). One potential tool identified for this was [Survey Monkey](#) which includes data analysis tools (another possibility was [Qualtrics](#)). Sandro Calmanti produced an [example test survey](#) using Survey Monkey to give an indication of how it would look. In the end, however, it was decided to use GoogleDocuments. This is a [test example](#) in English. A full version in Italian was developed and used for the WP8 Venice workshop.

12. Next steps

As indicated above, it is important to consider and discuss 'Next steps' during the workshop. These fall into two categories: first in relation to stakeholders, and second in relation to other CLIM-RUN WPs (in particular WP2 and WP3).

Question 10 in the 'Your institution/organisation' part of the Perception Questionnaire asks some questions about future stakeholder levels of involvement in CLIM-RUN (e.g., with respect to training, future workshops, sharing data, testing datasets etc). After the workshop, it may be helpful to categorise your stakeholder contacts according to their level of interest and desired level of involvement, e.g., those with a general interest, those keen for closer and more technical involvement etc. Drawing heavily on the reports from the WP7 workshops held to date, here are some suggested next steps for stakeholder involvement:

- More detailed/technical interviews
- Completion of the more technical parts of the perception and data needs questionnaire

- Email newsletter (
- Following up contacts for additional stakeholders (names suggested by existing contacts, and making use of stakeholder networks)
- Identification of contact people for key organisations/institutions
- Continued contact with stakeholders unable to attend the workshop
- Development of contacts with any 'missing' groups of stakeholders
- Continue to build contacts (events, conversations, conferences)
- Mechanisms for reporting back on progress (based on work and discussions with WP2 and WP3 – see below)
- Exchange of data/metadata
- Production of a stakeholder 'communication' pack (a new objective identified by WP7)
- Stakeholder wikis to allow selected stakeholders password-controlled access to material. Already set up for the WP5 Savoie case study.

It will be essential to work closely with WP2 and WP3 in order to follow up the information and data requests coming from stakeholders. This will include:

- Production of new examples of products and outputs (maps, figures, datasets etc)
- Identification of key data/output gaps and strategies for tackling them
- Identification of priorities
- Identification of requests which are 'out of scope' of CLIM-RUN or impossible to meet
- Definition of new modelling tools required

Appendix 3 lists the feedback from the stakeholder meetings required by WP2 (modelling) and WP3 (observations and downscaling support). It should be possible to provide this information based on the data requirements part of the questionnaire together with supporting evidence (e.g., on timeframes) from other parts of the questionnaire as well as general discussions with stakeholders. This list is also available from the WP2 wiki.

In order to monitor requests and progress being made, WP7 has set up an [interactive spreadsheet](#) which they have worked on with WP2. This could provide a useful template for other WPs. If this template is used, the information on climate variables, spatial resolution, temporal horizon, temporal resolution and 'required for' (for other WPs this will be for impact, sector etc) should be provided by the case-study teams, with the case-study teams and WP2/WP3 updating the comments and status columns as work progresses. Ultimately the status fields should indicate the agreed 'solutions', where something is ultimately not possible or where alternative variables/data are proposed.

WP7 and WP2 have also produced a list of requested and available variables for [Renewable Energy](#) – available from the WP2 wiki. Also available is a list of '[non-covered](#)' fields and '[possible improvements of climate numerical tools](#)'. Finally, WP2 has produced template tables for listing '[possibly available variables for each case study](#)'.

13. Workshop 1 reports

Deliverables – the workshop report deliverables are listed in Section 14 and should be Public documents.

In addition, the precedent originally set by WP7 should be followed and a report should be produced from every workshop. These should be made available on the relevant WP wiki page (several are already available on the WP7 and WP5 wikis). The Perception Questionnaire states that:

“This information will be used only by the CLIM-RUN research team and only for project purposes. Individual respondents will not be identifiable in any synthesis reports/analyses made available outside the CLIM-RUN consortium of researchers and stakeholders.”

Bearing this in mind, I think that most of you will want to/need to follow the example set by WP7 and that the individual workshop reports will thus be classified “Confidential” i.e., confidential to the project partners and stakeholders only. Where the individual workshop reports are intended for internal use and discussion with stakeholders, it may be appropriate for them (or parts of them) to be in the local language. All deliverables and material (such as summary tables of stakeholder requirements) needed by other WPs should, however, be in English. The deliverable reports can follow the same format (see below) as the individual reports but will provide a synthesis and contain less ‘personalised’ information.

It is proposed to use a [workshop report template](#) closely based on that developed by WP7, with the following sections:

1. Summary
2. Introduction
 - Workshop details, stakeholders involved, methods, materials used, what worked well, what didn’t work so well
3. Main results
 - Key issues from the workshop
 - Overview of stakeholder perceptions and awareness/knowledge, current use of information, key impacts/sectors/applications
 - Any barriers to stakeholder involvement/communication
 - Summary of stakeholder needs (focusing on those that are potentially more problematic and sector/case-study specific) including timeframes, scales, variables
 - Main priorities
4. Next steps
 - Working with stakeholders (see above)
 - Working with CLIM-RUN partners (see above)
5. Resources

- Relevant documents, web sites etc
- Annexes (the following are suggestions of potentially useful additional information)
- Workshop programme
 - Example of workshop material circulated
 - List of attendees? May be issues of confidentiality and holding of personal information.
 - Summary of climate variables and advantages/disadvantages (see the WP7 example in Appendix 4)

14. Key future dates

During the Executive Committee Skype conference held on 7 July it was agreed that a small team will work on the 'translation' of the experience of the workshops and stakeholder requests into things that can be provided by WP2/WP3, and summarise this translation (for example, into basic guidelines and a key stakeholders database). This process will also help WP2 to define and develop new modelling tools (Task 2.2) and WP3 to develop new downscaling tools (Task 3.4) and should be done immediately following the workshops. The CET will play an important part in this process.

The first CLIM-RUN training workshop is currently being planned for October 2012 at ICTP.

According to the project DoW, the second stakeholder workshops are scheduled for February 2013.

Due/forthcoming Deliverable/milestone dates relating to the workshops:

D4.1 First workshops organisation (August 2011 – this document)

D4.2: First workshops synthesis report (March 2012)

MS9/MS17 Definition of CET and SET (May 2011)

Workshop reports:

D5.1 (October 2011)

D6.1, D7.1, D8.1 (August 2011 – but delayed because many of the workshops have been held in September/October)

Appendix 1: Good practice checklist for facilitating stakeholder involvement in research projects

From Agnew, M.D., Goodess, C.M., Hemming, D., Giannakopoulos, C., Sahabi Abed, S., Bindi, M., Dibari, C., El-Askary, H., El-Raey, M., Ferrise, R., Harzallah, A., Hatzaki, M., Kostopoulou, E., Lionello, P., Sánchez-Arcilla, A., Senouci, M., Sommer, R., Zoheir Taleb, M. and Tanzarella, A., Part V, Chapter 2 Stakeholders, in *Regional Assessment of Climate Change in the Mediterranean*, 2011: A. Navarra, L.Tubiana (eds.), Springer, Dordrecht, The Netherlands

Not for further circulation.

Box 2.1. Good practice checklist for facilitating stakeholder involvement in research projects

- Ground-level knowledge and contacts are essential to ensure a network of the most appropriate stakeholders and key players.
- It is important to identify the relevant arena for decision-making – regional/local, and whether the focus is on practitioners or policymakers.
- It is good to include people from diverse perspectives: e.g., government departments and agencies, public and private sector bodies.
- Previous projects and meetings/conferences/workshops are useful for identifying potential stakeholders.
- Identify at an early stage the level of stakeholder involvement that is desired (for the CIRCE case-studies, this was the ‘participatory’ level).
- For the participatory level of involvement, early contact with stakeholders is vital (ideally case-study workshops would have been held at the beginning of CIRCE as well as at the end).
- Email and telephone are useful for making first contact.
- Regular mailings are good for maintaining and developing contact, supported by informal/formal meetings.
- It is important to provide motivation for stakeholders to get involved in the absence of financial reward or expenses for attending meetings etc. Thus the benefits and opportunities of getting involved need to be highlighted at an early stage (e.g., access to experts and data, sharing data/information, chance to influence the course of the research, working on ‘real-life’ problems and solutions together).
- In this context, it is good to identify very specific areas and stages of the research where stakeholders can contribute and participate.
- Demonstrate to stakeholders the ‘added value’ of outputs and products from the project, particularly where these are new.
- Aim to provide tailored/targetted and regionally/sectorally focused results and examples.
- Where necessary and appropriate, provide information in local languages.
- Briefing notes and information sheets focusing on ‘What is it?’, ‘What does it show?’ and ‘Why is it relevant?’ are good tools for presenting indicators of change and variability to stakeholders.

- Acknowledge that stakeholders may be as/more interested in current climate change and variability and shorter-term forecasts and predictions, rather than longer-term climate change projections.
- Clearly specify the aims and expected outcomes of stakeholder workshops.
- Circulate relevant material in advance of workshops, e.g., briefing notes and information sheets, leaflets, a perception or other preliminary questionnaire.
- Perception questionnaires are useful for beginning to understand stakeholders' attitudes towards risk and their decision-making framework.
- Encourage mutual feedback and exchange of information on areas or issues for which researcher input has had an impact on stakeholder decisions and activities, and areas for which stakeholder input has had an impact on research.
- Linking with other projects or events can help to increase the stakeholder workshop audience.
- Provide a feedback form at the end of workshops.
- The World Café is a good approach for facilitating active participation and discussion in a workshop setting.
- Involve stakeholders as speakers and, at a minimum, include a researcher/stakeholder 'roundtable' discussion in workshop programmes.
- Use workshops to demonstrate and get feedback on tools developed in the project (e.g., Geographic Information Systems, decision-making tools).
- Consider using multi-media and audio-visual techniques where possible, particularly when involving the public.
- Provide stakeholders with feedback on final workshop outcomes, stakeholder relevant project reports, and policy recommendations and guidelines. This is especially important for encouraging follow-on work and active participation in future projects.

Appendix 2: The five CLIM-RUN key stages

Stage setting (May to September 2011)
<ul style="list-style-type: none"> • First (stage-setting) stakeholder workshops • First formal stakeholder contact • Beginning to define ‘who’ and ‘what’
Mapping the issues (May to September 2011)
<ul style="list-style-type: none"> • Prior to/during/after first stakeholder workshops • Perception and data needs questionnaires
Iterative consultation and collaboration (ongoing)
<ul style="list-style-type: none"> • Understanding stakeholders needs in terms of climate information to sustain rational and well-informed decision making in the context of climate variability and change • Iterative process of developing/testing/improving data products/tools and training/guidance information • Design/run/analyse new climate model simulations • Find a consensus on priorities for development of climate services (e.g., utility of data vs capacities to provide data) • Fluid circulation of information (and climate data) between WP2 and WP3 (provision of data and modelling methods answering users’ needs), WP4 to WP8 (definition and implementation of case studies, assessment of the meeting of supply/demand) and finally WP1 (conceptualization of climate services in the Mediterranean) • Two training workshops at ICTP (May 2012 and August 2013)
Consolidation and collective review/assessment (February to August 2013)
<ul style="list-style-type: none"> • Second stakeholder workshops (February 2013) • How far have we got? • How successful have we been? • What are the remaining problems/gaps? • How to sustain and extend the interactions?
Going forward – synthesis and recommendations (February 2014)
<ul style="list-style-type: none"> • Proposal for Mediterranean Climate Services Network • Final workshop

Appendix 3: List of the outputs/feedback from the stakeholder meetings required by WP2 and WP3 (see WP2 wiki for latest updates)

LIST FOR WP2 IN CLIM-RUN **(a similar list should be done in WP3) :**

List of the outputs from the stakeholder meetings required by WP2/WP3

During the stakeholder meeting, a list of variables meteorological/climatic outputs should be identified. Those variables will be passed on to the modelling group which can evaluate if such variables are already provided or if some improvement in their models can satisfy the demand. To help, the modelling group with the required variables the following characteristics/conditions are needed.

- Identification of the variables of the climate system required by each key sector: the variables should be climatic variables such as cloud cover, radiation flux, temperature, precipitation.
- Identification of the specific sector indicators: Each sector is probably already using some specific climatic indicators that you are commonly using for decision making (such as comfort indices, extreme winds, brightness...). They should be communicated to the modelling group as well as how they are evaluated/calculated.
- Spatial and temporal scales: The variables should be defined over a specific geographical domain: country, region, town..., and at a specific frequency: yearly, monthly, daily, 6h....
- Temporal horizon: The variables should be defined over a specific period of time: the last 50 years, the next 3 months, the next decade, next century.
- statistical needs (mean, variance, tails) or realistic chronology: The variables can be provided with different characteristics: the mean value with its standard deviation, the variance, the extremes or daily/monthly timeseries over the last century, the next century.
- degree of precision, uncertainty: do you need the variable with a 100m, 1 km, 100 kms resolution, and what precision do you need for each variable; for example: 0.1°C increase in 100 years? Change of 0.5 W/m² in the radiation over the last 50 years?

availability of local observed climate dataset, of sector dataset with the associated data policy: Does each sector already have some observed data for your local study at the site of interest. Can they be easily accessible and given to the modelling group? What is the data policy attached to them?

Appendix 4: Summary of variables required and their advantages/disadvantages

This example comes from WP7 (produced by Melanie Davis)

Climate variable required	Key relevance to stakeholder	Advantages	Disadvantages
Temperature	1(PV),8,12	15. High certainty variable 16. Indication of atmosphere stability	17. Not a primary variable affecting energy yield, although very important having direct applications in both PV and CSP
Humidity	1(CSP),8,12?	<ul style="list-style-type: none"> High impact on CSP thermodynamic process (provides energy storage capacity) 	18. Limited application in complete RE yield context
Aerosol variability	1,12	<ul style="list-style-type: none"> ⚠ V.High impact on solar (especially concentrating technologies like CSP and CPV) ⚠ Unaccounted for, but poss. v. important factor in future 	⚠ Unclear of future pollutant reduction stimulus which - high variability poss.
Dust / sand variability	1,4,5,12?	⚠ V.High impact on solar	⚠ Hard to measure, forecast (associated

Include: hailstorms, snow			with wind?)
Wind speeds higher than 20 (lowest threshold) 30, 40, 50 (optimum), 60, 70, 80 (highest threshold) km/h (Ideally at heights between 25-100m) Include: frequency and duration	1,2,4,5,6,7,8,10,11,12	<ul style="list-style-type: none"> ⤴ Key info for both solar and wind sectors ⤴ Primary variable for RE sector (i.e. directly affects energy yield calculations) 	<ul style="list-style-type: none"> ⤴ Highly variable, accuracy limited? ⤴ Different heights required for full analysis - availability?
Wind speeds lower than 20 km/h (‘wind drought’) Include: prevailing wind direction (frequency and duration)	2,4,5,8,9,10,11,12	<ul style="list-style-type: none"> ⤴ Key wind variable ⤴ Primary variable for RE sector 	<ul style="list-style-type: none"> ⤴ Highly variable, accuracy limited? ⤴ Different heights required for full analysis - availability?
DNI (Direct Normal Irradiance)	1,4,5,12	<ul style="list-style-type: none"> ⤴ Key solar CSP and CPV variable ⤴ Limited observed data ⤴ Primary variable for RE sector 	<ul style="list-style-type: none"> ⤴ Limited observed data (currently derived from GHI observations) ⤴ Highly variable due to clouds, therefore forecast accuracy is limited
GHI (Global Horizontal Irradiance)	1,4,5,12	<ul style="list-style-type: none"> ⤴ Key solar PV variable 	<ul style="list-style-type: none"> ⤴ Highly variable due to cloud cover, accuracy limited..
or DHI? (Direct Horizontal Irradiance)	1,4,5,12	<ul style="list-style-type: none"> ⤴ Key solar variable ⤴ 1^o variable for RE sector ⤴ Solar dimming measure 	<ul style="list-style-type: none"> ⤴ Highly variable due to clouds, accuracy difficult

Seasonal, 1 month - 1 yr	1,2,3,5,6,9,10,12	<ul style="list-style-type: none"> Useful for short term project planning, ROI, maintenance Higher spatial resolution 	<ul style="list-style-type: none"> Requires understanding in context of decadal
Decadal, 1 yr - 30 yrs	1,2,3,4,5,8,12	<ul style="list-style-type: none"> Useful for long term planning, ROI, yield, RE sector planning 	<ul style="list-style-type: none"> Requires understanding in context of seasonal Lower accuracy, spatial resolution

1. Solar Stakeholders All 2. Wind Stakeholders All 3. Hydro Stakeholders All	5. Insurers/Re-insurers 6. Project developers	7. Project managers 8. Grid planning	9. Grid transmission operators 10. Energy traders	11. RE Technology developers 12. RE climate software system developers
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Current status (June 2011)

Key Q's / comments:

- Could / can seasonal - decadal climate analyses be used at the site selection resolution level? If not, where is it's best application in the RE decision making / analysis process?

Bankability (and cash-flow) of project at its design stage based on the climate resource analysis of site/area proposed for RE project.

Analysis/quantification of the risks to investment, energy generation etc. (e.g. low wind/solar year, especially within first few years of investment)
- Should / can CLIMRUN WP7 look at all the climate variables? If not, which ones would be most valuable / representative in the RE context?

The answer to this question should come out of the “energy models” work Indradip is pursuing at the moment.

- ✧ Should / can CLIMRUN WP7 look at all the stakeholders? If not, which ones would be most valuable / representative in the RE context?
Investors and insurance sector are key for benefiting from mid-long term climate data (due to answer of first question). Those influencing investors (e.g. national/regional government, NGO's, consultants etc.) should also be included in this category. The other stakeholders are important, but secondary at this stage.
- ✧ Should / can CLIMRUN WP7 look at all the technologies? If not, which ones would be most valuable / representative in the RE context?
Proposed order of importance for each technology (based on market share, growth rate, vulnerability due to climate)
Wind, as is the largest share and fastest growing RE.
Solar CSP is very rapidly growing and has potential to generate considerable energy from a single project.
Hydro, second largest market share
Solar PV
Biofuels