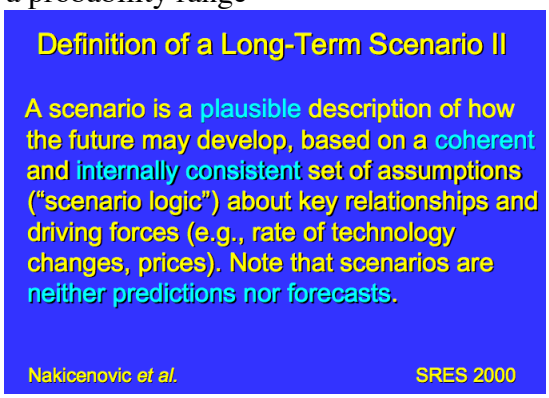
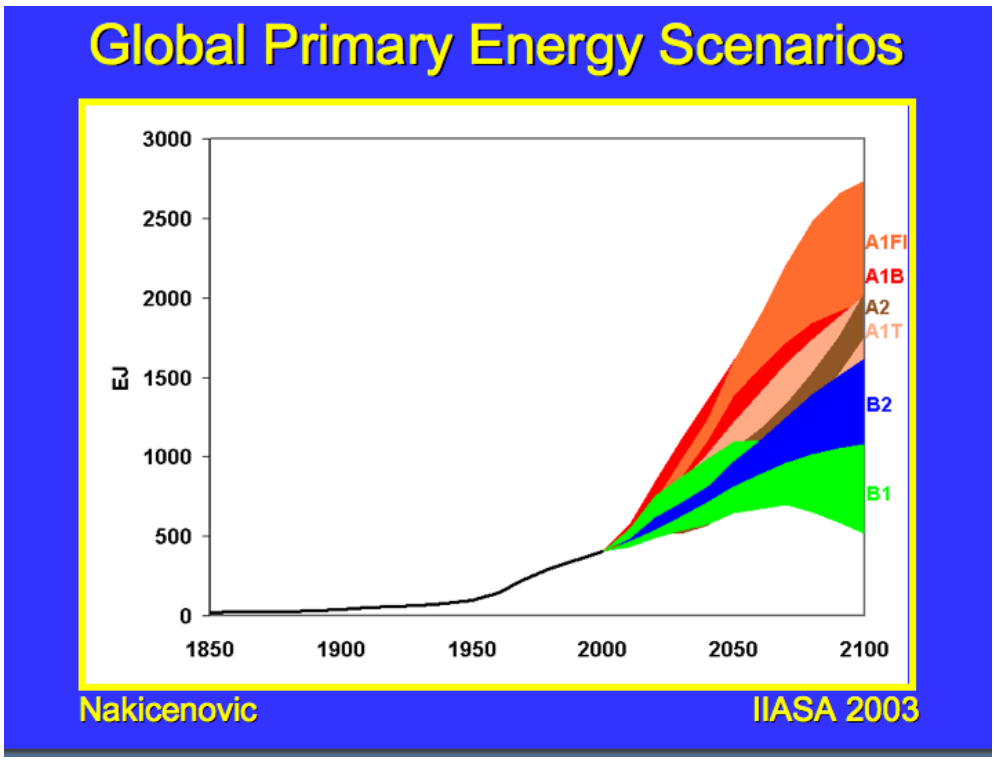
Jean Laherrere September 2009

Updating IPCC SRES 40 2000 energy scenarios with present data and 2008 IEA & 2009 EIA forecasts

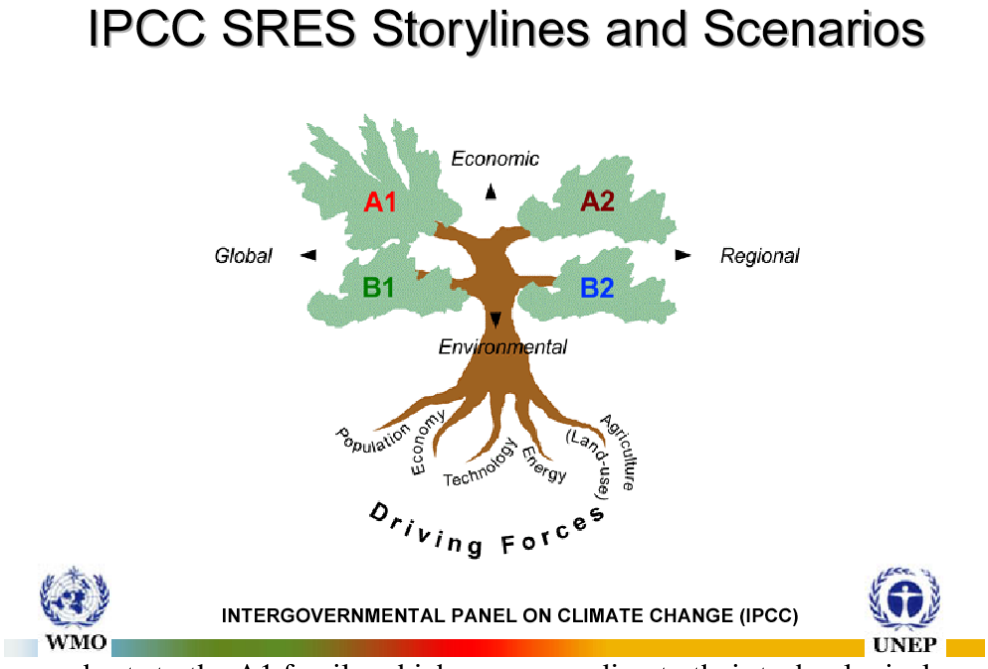
The last IPCC reports 2001 TAR and 2007 AR4 used 40 SRES (*Special Report on Emission Scenarios*) 2000 scenarios designed in 1998 by IIASA Dr Nakicenovic to model all the climate projections. Despite critics (Laherrere "Estimates of Oil Reserves " IIASA International Energy Workshop June 19-21 2001 Laxenburg http://www.iiasa.ac.at/Research/ECS/IEW2001/pdffiles/Papers/Laherrere-long.pdf) and requests to change the 2000 SRES, the 2007 AR4 report used again the same obsolete 2000 SRES.
These scenarios were storylines (brainstorming) based on qualitative literature (Girod 2006) with the help of Shell (Ged Davis was the author of most Shell -and recent CIA- scenarios, with fancy names being more a piece of literature than scientific work, and he is now with IIASA-Global Energy Assessment launched in 2007).
Shell scenarios are well forgotten, but the SRES scenarios are the base of present efforts of many governments to prevent climate changes and they should be reliable.
Nakicenovic *(«Emission scenario primer» N. Nakicenovic IIASA Aspen 7 July 2003*) states very well that scenarios are neither predictions nor forecasts, despite that most IPCC readers think that their results are forecast with a probability range



These scenarios are **storylines** and their authors did not bother to fit in the industrial real data. They start in 1990, with value every decade up to 2100.
1990 and 2000 data sets are guesses, with different values for each scenario and not the real values.
These emissions scenarios were based of course on energy values and the primary energy was taken within a huge range varying in 2100 from 514 EJ (B1 image) to 2727 EJ (A1G message), which is a 5 to 1 range!
Nakicenovic's graph on primary energy shows clearly this huge range and the highest values being the A1F1 family should be checked now to see if this 1998 storyline is still valid with present 2009 data and forecasts.



These **storylines** are grouped in 4 families, describing the economic and social situations
-A1 = fast economic growth
-A2 = heterogeneity
-B1 = convergent world
-B2 = local solutions



There are three subsets to the A1 family which vary according to their technological emphasis: A1F1: an emphasis on fossil fuels, A1B: a balanced emphasis on all energy sources and A1T: emphasis on non fossil energy sources.
In general, the A1 world is seen as BaU or reference scenarios, the A2 storyline as a worst case BaU. The B1 and B2 are clearly not seen as BaU scenarios, but as intervention scenarios, which assume specific actions, changing policy or values (Girod 2006).
Datasets are available from the SRES website: http://sres.ciesin.columbia.edu/final_data.html

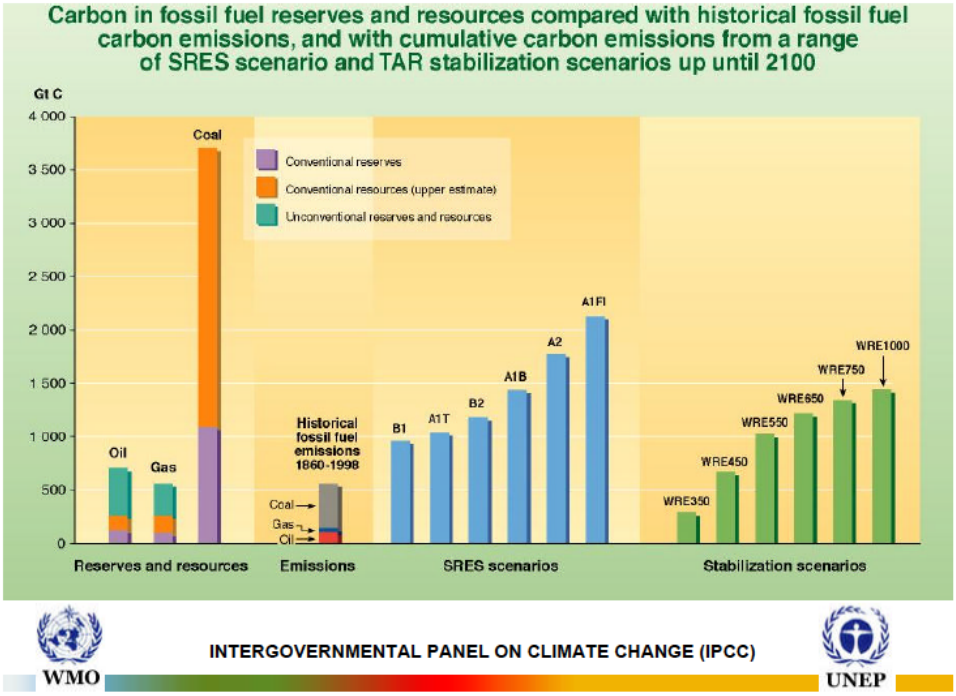
Instead of A1F or A1F1 scenarios found on IPCC graphs, SRES scenarios report different names like A1ASF or A1G AIM. I was unable to find the reason for using different names in graphs and in SRES! In fact I do not know what are A1F values, compared to the reported A1 ASF or A1G AIM! In brief it seems impossible to find on the web what is in the SRES data compared to what is shown in IPCC graphs!
Girod in 2009 ("*The evolution of the IPCC's emissions scenarios*" *http://www.uns.ethz.ch/people/staff/girodb/publications/Girod_et_al._2009_The_evolution_of_the_IPCC_s_emissions_scenarios.pdf*) states that SRES have changed, but it was from 1990 to 2000!
I found papers using the term post-SRES, but these SRES modified to stabilize CO2 were not used by IPCC 2007 and the next IPCC report AR5 in 2014 (?) will drop SRES energy & emissions scenarios to use only radiative forcings .

The SRES scenarios were named (ASF, AIM, IMAGE, MESSAGE) from different models names from different institutions during the 1990s. *http://www.cccsn.ca/Help_and_Contact/Emissions_Information-f.html*

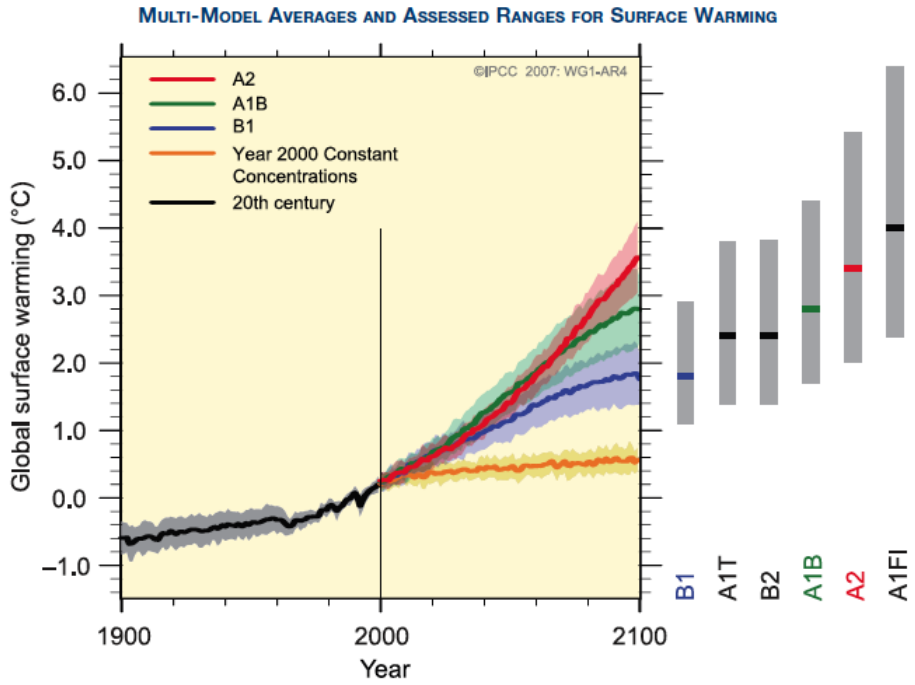
Tableau 1: Équipes de modélisation qui ont pris part à la quantification des gammes du SRES

SIGLE	NOM DU MODÈLE	INSTITUTS	RÉFÉRENCES
AIM	Asian Pacific Integrated Model	National Institute for Environmental Studies (NIES), Japan	Morita et al. (1994)
ASF	Atmospheric Stabilisation Framework Model	ICF Consulting, USA	Lashof & Tirpak (1990); Pepper et al. (1998); Sankovski et al. (2000)
IMAGE	Integrated Model to Assess the Greenhouse Effect (used in connection with the Central Planning Bureau (CPB) WorldScan model)	National Institute for Public Health (RIVM), The Netherlands	Alcamo et al. (1998); de Vries et al. (1994, 1999, 2000); de Jong & Zalm (1991)
MARIA	Multiregional Approach for Resource and Industry Allocation	Science University of Tokyo, Japan	Mori & Takahashi (1999); Mori (2000)
MESSAGE	Model for Energy Supply Strategy Alternatives and their General Environmental Impact	International Institute for Applied Systems Analysis (IIASA), Austria	Messner & Strubegger (1995); Riahi & Roehrl (2000)
MiniCAM	The Mini Climate Assessment Model	Pacific Northwest National Laboratory (PNNL), USA	Edmonds et al. (1994, 1996a,b)

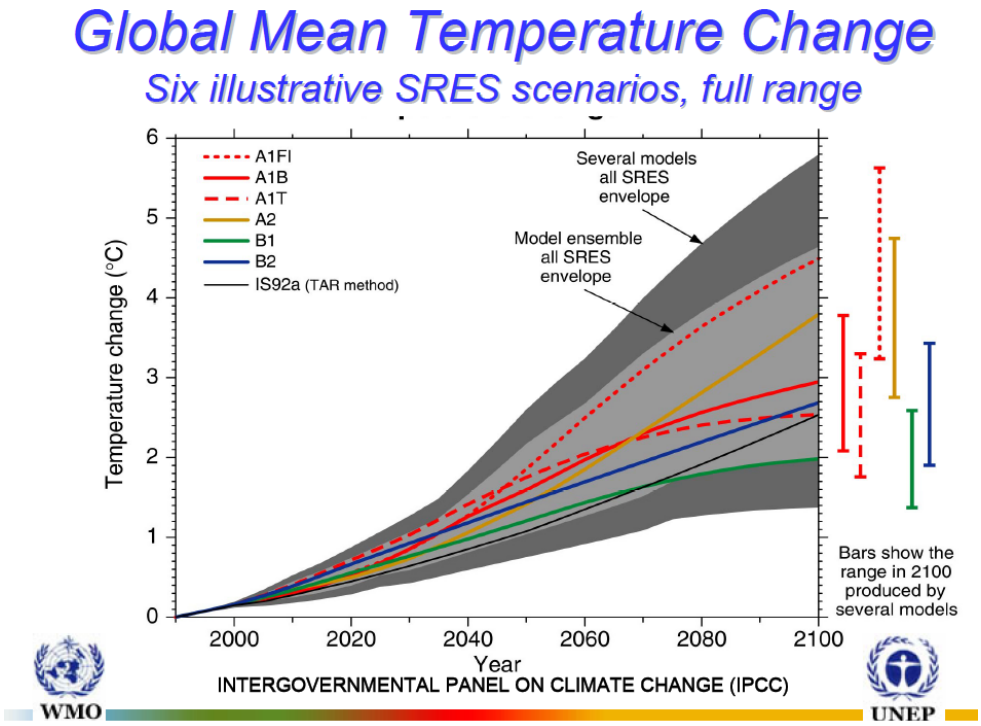
A1F corresponds to a cumulative consumption of fossil fuels of 2128 GtC (1400 Gtoe) from 1990 to 2100, being an annual average of 13 Gtoe compared to 9,6 Gtoe in 2007.
In this graph (*TAR WGIII-B.Metz*) A1F1 is possible when resources (what is in the ground) are added to reserves (what is expected to be produced), but most of resources will stay in the ground: it is the case of coal in France: we have coal resources, but no more coal reserves because no one want coal mines (NIMBY).



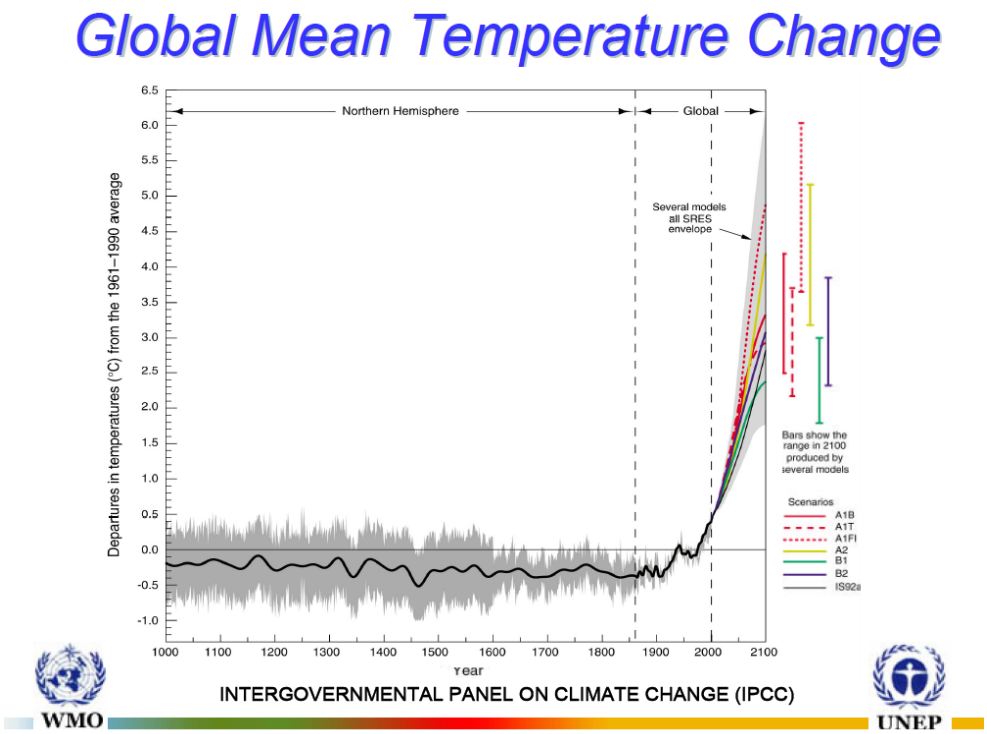
The 2007 AR4 report (WG1-spm) displays a range of temperature where of course A1F1 displays in 2100 a global warming from 2 to 6,5 °C



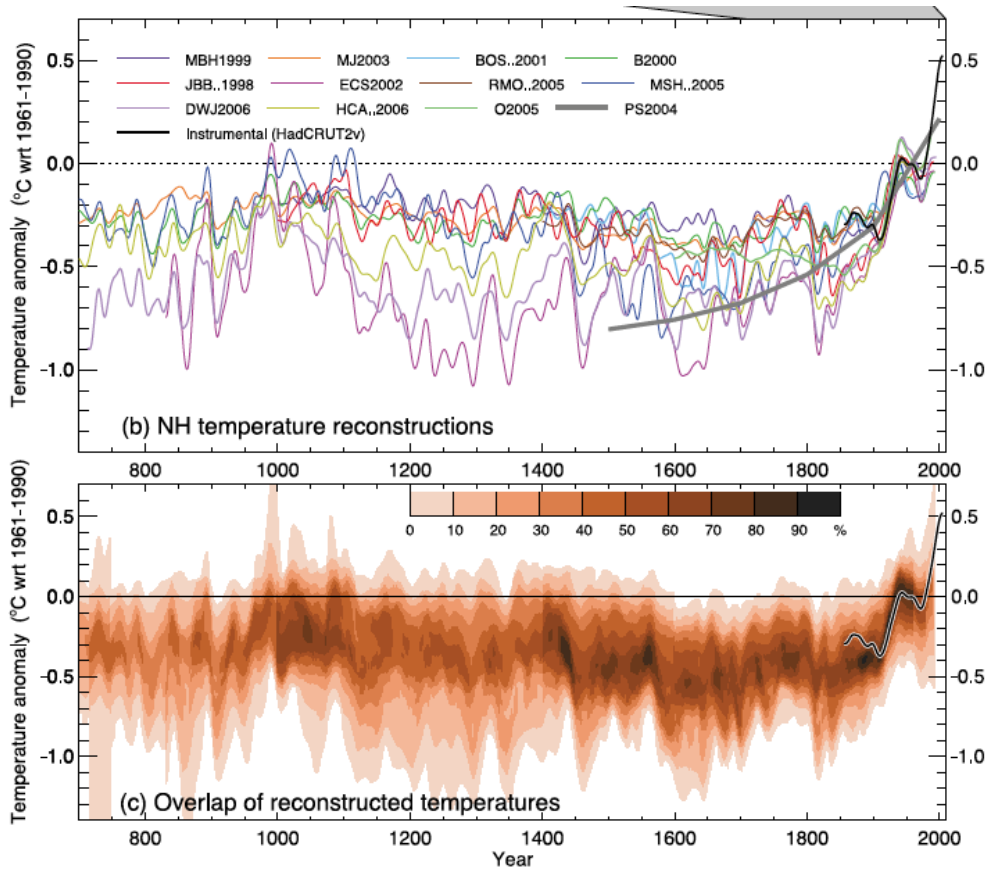
The 2001 TAR report already used the same SRES scenarios and the models got about the same results. A1F1 was reported with a range in 2100 from 3 to 6°C *«Long-term scenarios of air-pollutant emissions» N. Nakicenovic & K. Riahi IIASA Laxenburg January 2005*



The same range in 2100 was displayed for the last millennium with the famous infamous «hockey stick» graph, which denied the Little Ice Age and the Medieval Warm Period, graph which was rightly abandoned in the AR4 report, but still displayed by some unscientific media.



The AR4 graph for the same period is better: showing the Medieval Warm Period and the Little Ice Age, censured in the previous graph.



Modelling climate requires huge computer power and takes several months. Each point of computation is the centre of a grid of certain size. The size of the grids of the 23 models for atmosphere used in AR4 (WG1chap 8) is as follows:

Model, vintage	°	°
1: BCC-CM1, 2005	1,9	1,9
2: BCCR-BCM2.0, 2005	1,9	1,9
3: CCSM3, 2005	1,4	1,4
4: CGCM3.1(T47), 2005	2,8	2,8
5: CGCM3.1(T63), 2005	1,9	1,9
6: CNRM-CM3, 2004	1,9	1,9
7: CSIRO-MK3.0, 2001	1,9	1,9
8: ECHAM5/MPI-OM, 2005	1,9	1,9
9: ECHO-G, 1999	3,9	3,9
10: FGOALS-g1.0, 2004	2,8	2,8
11: GFDL-CM2.0, 2005	2	2,5
12: GFDL-CM2.1, 2005	2	2,5
13: GISS-AOM, 2004	3	4
14: GISS-EH, 2004	4	5
15: GISS-ER, 2004	4	5
16: INM-CM3.0, 2004	4	5
17: IPSL-CM4, 2005	2,5	3,75
18: MIROC3.2(hires), 2004	1,1	1,1
19: MIROC3.2(medres), 2004	2,8	2,8
20: MRI-CGCM2.3.2, 2003	2,8	2,8
21: PCM, 1998	2,8	2,8
22: UKMO-HadCM3, 1997	2,5	3,75
23: UKMO-HadGEM1, 2004	1,3	1,9

average 2,5 2,8

The average grid is 2,5°x2,8° or about 300 km, which is too large to model detailed events, such as clouds.

I am amazed everyday by the display of clouds on TV in weather forecasts, showing clearly that the evolution of clouds cannot be modelled with one point every 300 km!

Vapour is the most important GHG, much more than CO2.

Lower clouds cool, higher clouds warm!

In AR4WG1 chapter 8: climate models and their evaluation, it is written

Box 8.1: Upper-Tropospheric Humidity and Water Vapour Feedback

Water vapour is the most important greenhouse gas in the atmosphere

*In many climate models, details in the representation of clouds can substantially affect the model estimates of cloud feedback and climate sensitivity. Moreover, the spread of climate sensitivity estimates among current models arises primarily from inter-model differences in cloud feedbacks. Therefore**, cloud feedbacks remain the largest source of uncertainty in climate sensitivity estimates**.*

*The sign of the climate change radiative feedback associated with the combined effects of dynamical and temperature changes on extratropical clouds is **still unknown**.*

The role of polar cloud feedbacks in climate sensitivity has been emphasized by Holland and Bitz (2003) and Vavrus (2004). However, these feedbacks remain poorly understood.

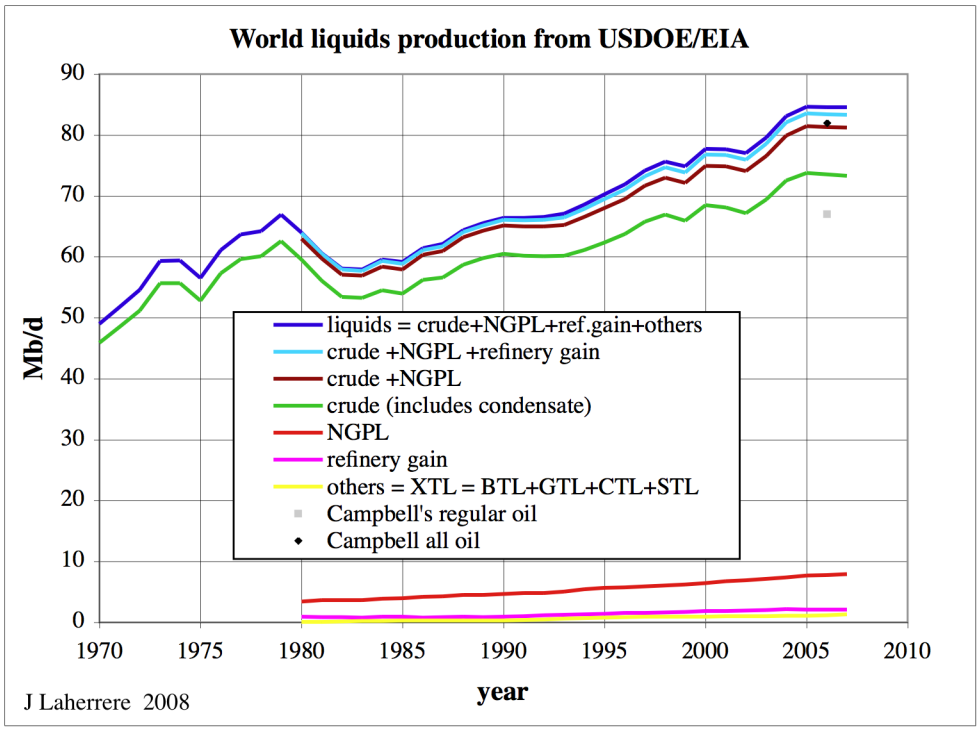
8.6.3.2.4 Conclusion on cloud feedbacks

*Despite some advances in the understanding of the physical processes that control the cloud response to climate change and in the evaluation of some components of cloud feedbacks in current models**, it is not yet possible to assess which of the model estimates of cloud feedback is the most reliable.***

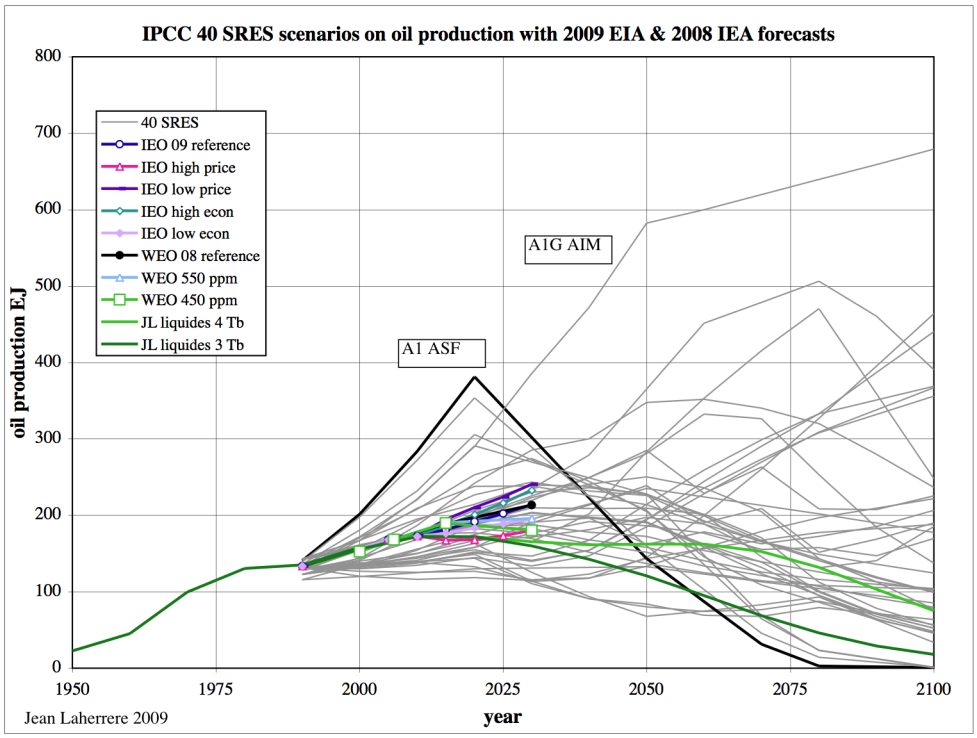
Let's compare SRES energy scenarios reported since 1990 every ten years up to 2100 and the present data and the forecasts from 2008 IEA WEO = World Energy Outlook & 2009 USDOE/EIA IEO = International Energy Outlook and also my own forecasts from the estimated ultimates coming from the creaming curves (extrapolation of cumulative discoveries = confidential database) versus the cumulative number of pure exploratory wells = new field wildcats) displayed in many of my recent papers available on the ASPO France website

-**Oil**

Oil is poorly defined in most reports and can represent only the conventional oil (regular of oil according to Colin Campbell with 67 Mb/d in 2006) or the all liquids (including biofuels, shale oil, CTL, GTL and refinery gain) with 85 Mb/d.

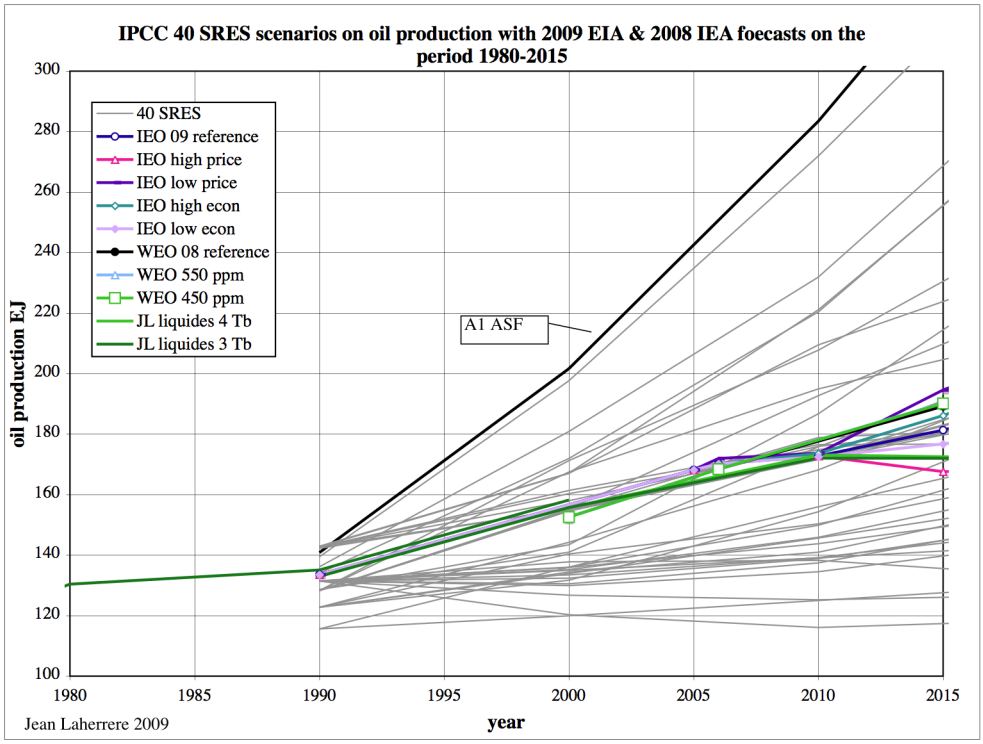


The 40 SRES are reported using metric units (SI of units which is the law in all European Union and in US since 1993 for the federal agencies) which is the Joule for energy (including heat).
Oil is reported with EJ = exajoule = $10^{E}18$ joule 1 toe = 41,8 GJ
1 Gtoe = 41,8 EJ 1 EJ = 24 Mtoe
Since IEA and EIA report liquids we have added our forecast of liquids production assuming an ultimate of 3 or 4 Tb.
The range of the 40 SRES is huge and it is amazing (in a 2007 report) to see that the values for 1990 are still showing a variation from 116 to 141 EJ when the real value is 133 EJ.
IPCC is wrong from -13% to +6%!
For 2000, the SRES range is from 120 to 202 EJ when the real value is 156 EJ.
IPCC is wrong from -23% to 29% !
For 2010, the SRES range is from 116 to 283 EJ when IEO 09 reference is 173 EJ (also my forecast) .
For 2030, the SRES range is from 111 to 385 EJ when IEO 09 range from 180 to 241 EJ (my forecast 160-165 EJ)



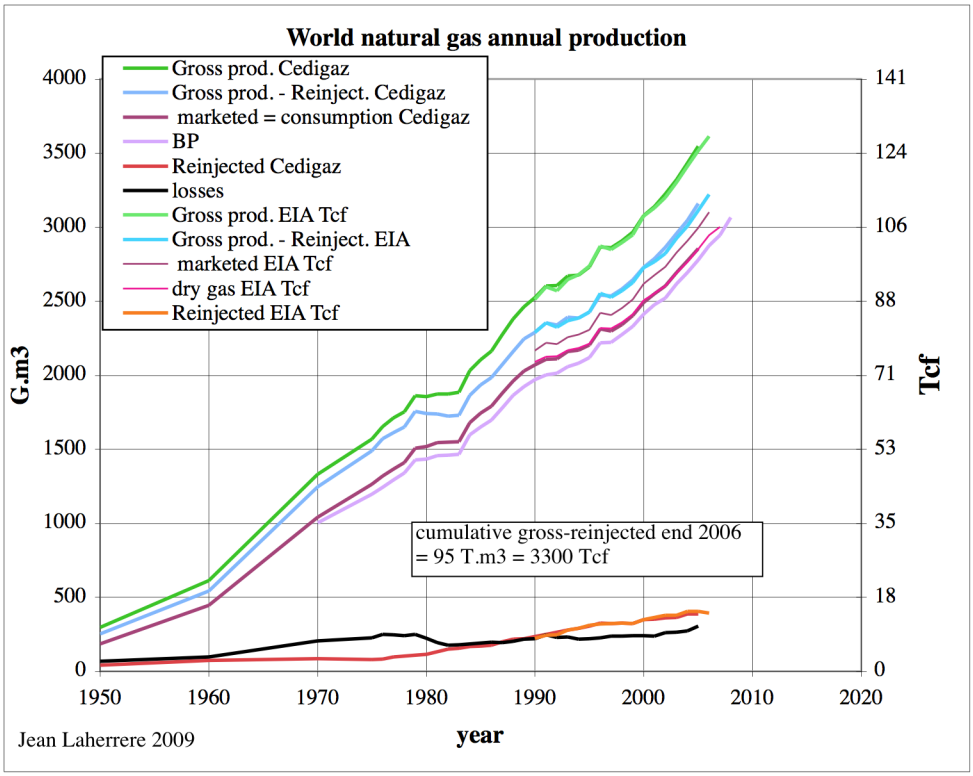
oil EJ = 24 Mtoe	1990	2000	2010	2020	2030
lowest SRES	116	120	116	119	111
highest SRES	141	202	283	381	385
IEO 09 reference	134		173	192	213
lowest IEO	134		173	168	180
highest IEO	134		174	210	241
WEO 08 reference		153			214
JL 4 Tb	133	156	173	172	165
JL 3 Tb	133	156	172	172	160
error from real %					
lowest SRES	-13	-23			
highest SRES	6	29			

The same graph for the period 1980-2015 better shows the difference between SRES and IEA-EIA forecasts, which are in a close range, without any comparison with SRES range.
The A1 ASF is really completely unreal!



-**Natural Gas**

Most of natural gas production (or consumption) is reported for dry gas (wet production less NGL = natural gas liquids), when gross production is much larger, but reinjected gas should be subtracted to have the quantity removed from the ground.



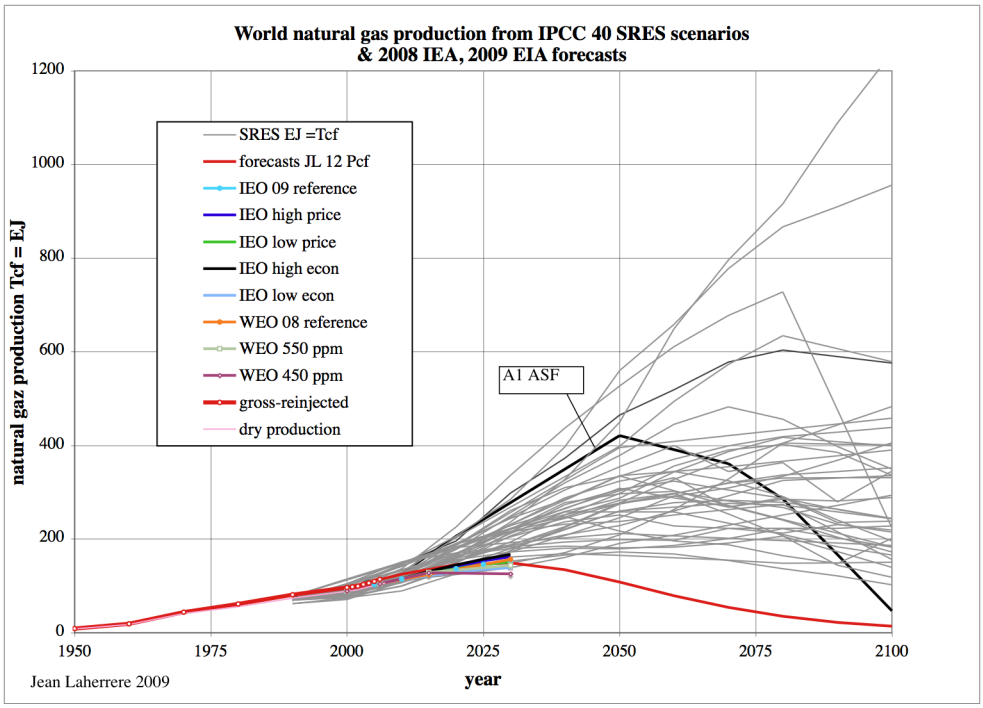
The SRES for natural gas is reported in annual EJ which is close to annual Tcf.
The range is huge like for oil but the real data is this time at the lowest and even out of the SRES range. One of the SRES (AG1 message) dreams of gas age based on oceanic hydrates, where consumption in 2100 could be more than 12 times to day consumption, but up to now no one knows

how to produce these dispersed resources (Laherrere 2008 “Hydrates updated” The Oil Drum http://europe.theoildrum.com/node/3819).

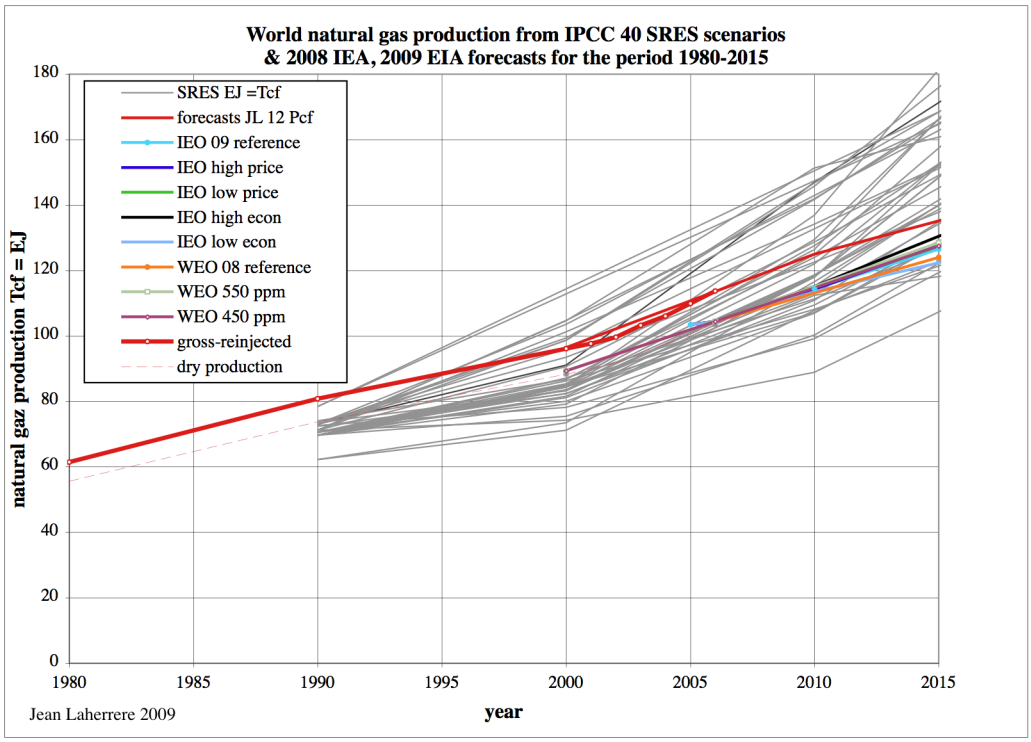
SRES values (used in 2007) were wrong compared to real values by -20 % to 18% for 2000

gas EJ = Tcf	1990	2000	2010	2020	2030
lowest SRES	62	71	89	124	139
highest SRES	78	105	151	226	336
IEO 09 ref	74		114	137	152
lowest IEO	74		113	129	139
highest IEO	74		115	144	167
WEO 08 ref	74	89			156
JL 12 Pcf	81	97	125	145	149
error from real %					
lowest SRES	-16	-20			
highest SRES	5	18			

For 2030 the highest SRES is more than double of the highest EIA forecast !



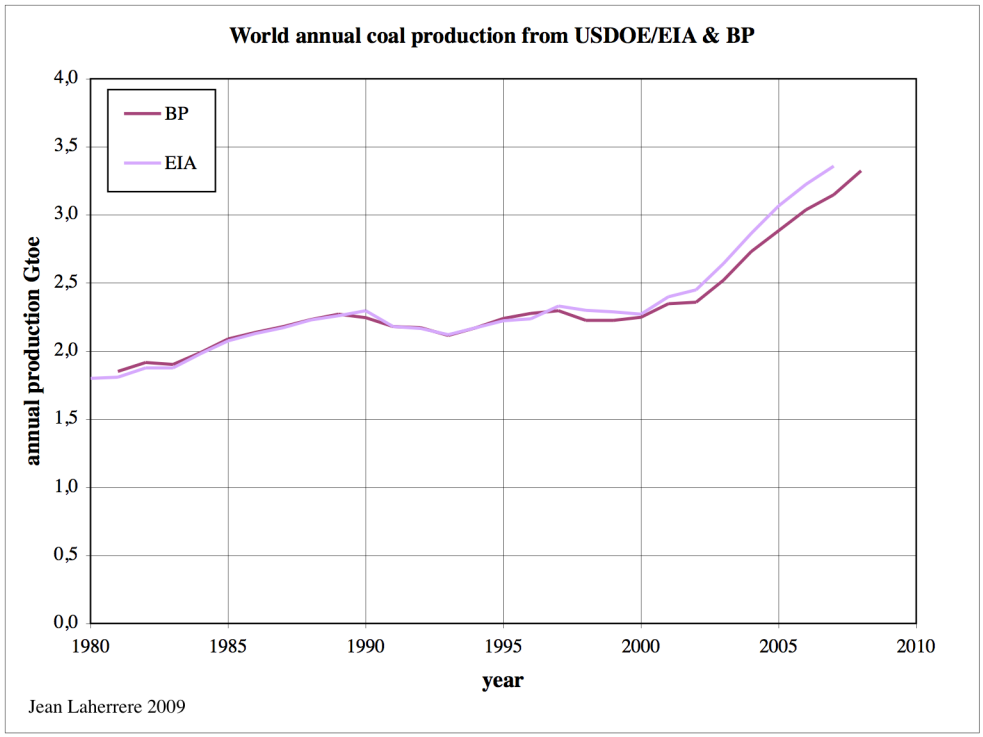
For the period 1980-2015, the range is smaller than it is for oil.



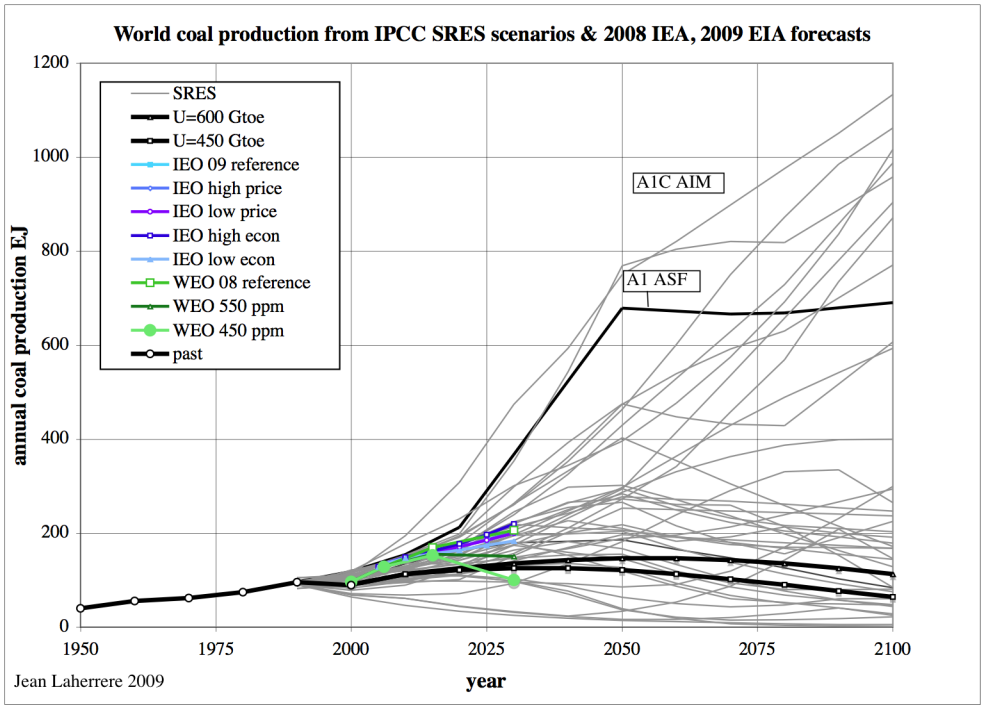
-Coal

Coal production is reported mainly in short tons, but also in tonnes and the heat content of coal varies from 5 MBtu/t to 30 MBtu/t. It is important to deal with production reported in energy equivalent (quad or EJ) or in Gtoe.

Because of difference in heat contents (badly reported), world coal production varies between the two sources: USDOE/EIA and BP.



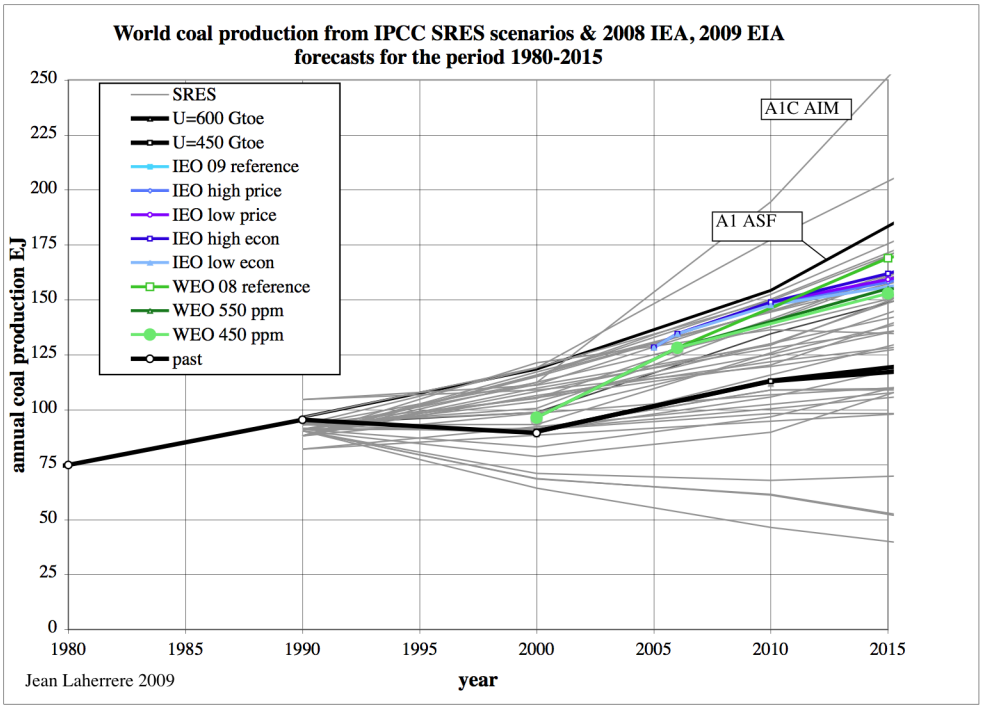
SRES are reported in EJ = 24 Mtoe. The two intensive fossil-fuels scenarios A1 ASF & A1C AIM look unrealistic compared to EIA & EIA forecasts and mine.



For 2000 SRES range is -28% to 26% compared to real value !

coal EJ = 24 Mtoe	1990	2000	2010	2020	2030
lowest SRES	88	69	61	45	33
highest SRES	105	121	195	308	474
IEO 09 ref	94		148	171	201
lowest IEO			148	164	184
highest IEO			149	177	219
WEO 08 ref		96			206
JL 600 Gtoe	95	89	113	125	135
JL 450 Gtoe	95	89	113	121	125
error from real %					
lowest SRES	-6	-28			
highest SRES	12	26			

For the 1980-2015 period, SRES range looks better than gas or oil!



-**Primary energy = PE**

Primary energy is the addition of different energy sources reported in different units and energy equivalences are needed. These equivalences need some assumptions which can vary from sources. IEA equivalences are the most used. France did change equivalence values in 2001 to match IEA assumptions, leading to some drastic changes.

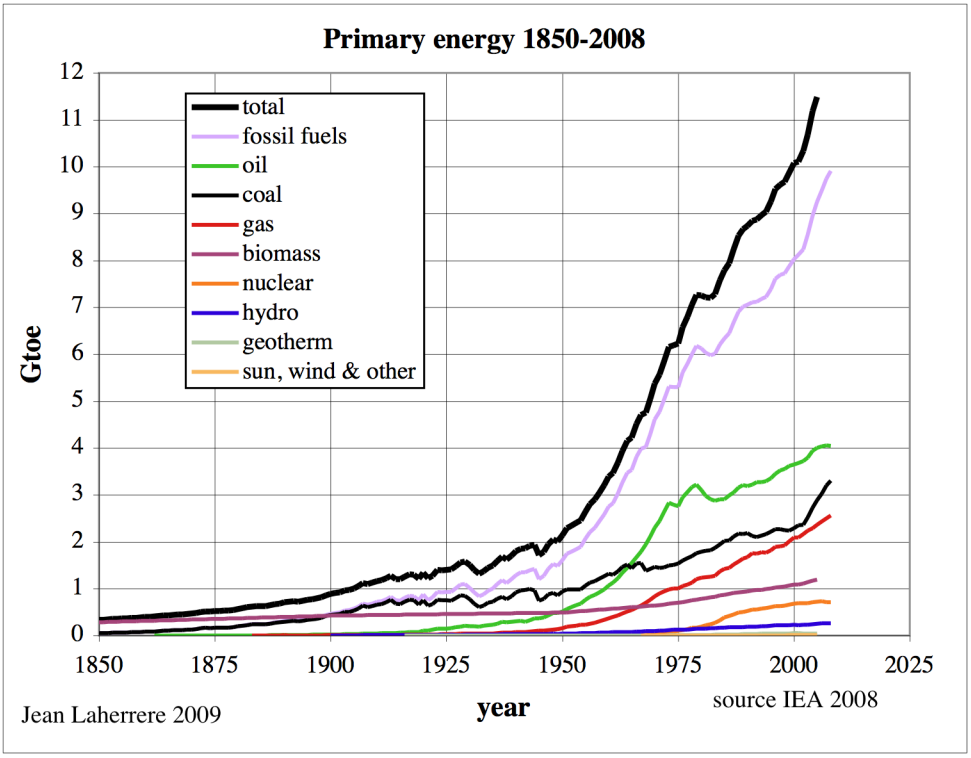
In DOE/EIA publications, the nominal efficiency for renewable energy sources (hydroelectric, biomass, wind, photovoltaic, and solar thermal) is taken to be the same as the efficiency of fossil-fuel steam electric plants, namely 33.2%. http://www.aps.org/policy/reports/popa-reports/energy/units.cfm

Some today take an efficiency of 40% , to-morrow could it be 50% ?

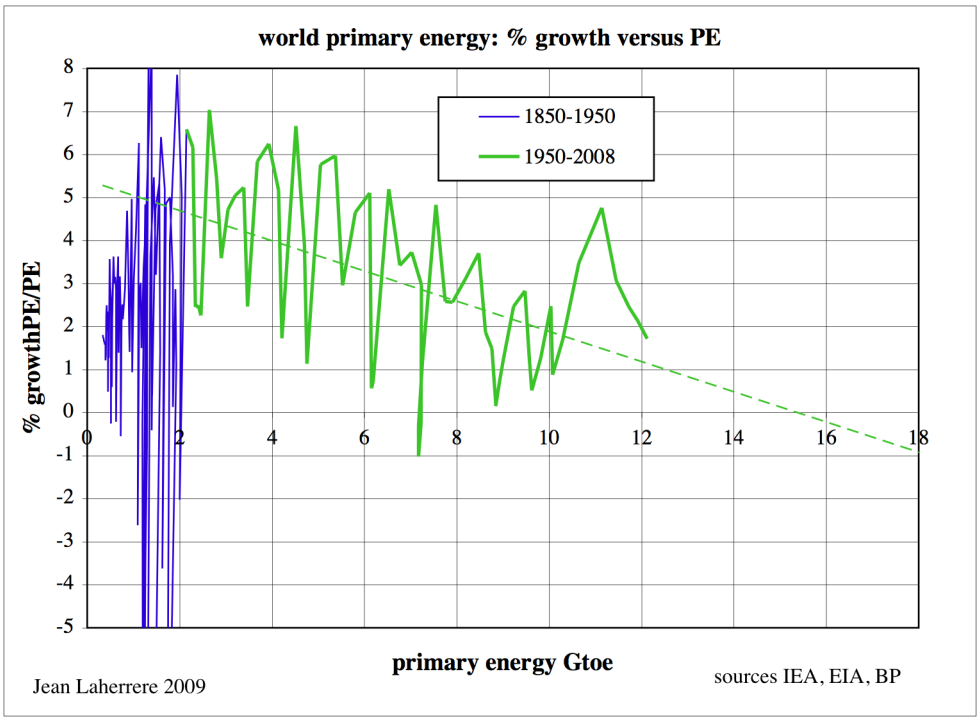
Another problem is to guess the non-commercial use of biomass ; like wood or dung

It is difficult to find historic data. It is possible to start in 1850, finding that primary energy at this time was very low, but it is because most of the work was done with human or animal muscles, which is not accounted for. It is hard to find the right equivalence between oil use and slave work, as it is often presented in the media where we have now about 100 or 200 slaves.

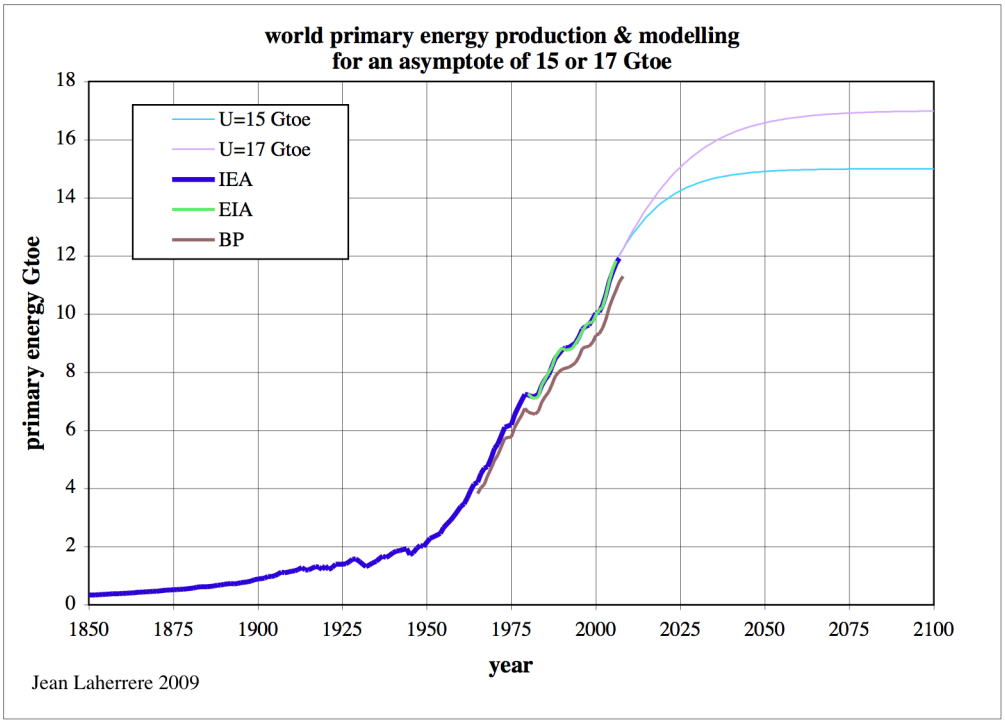
The following graph is for fossil fuels and nuclear up to 2008, but only up to 2006 for renewable.



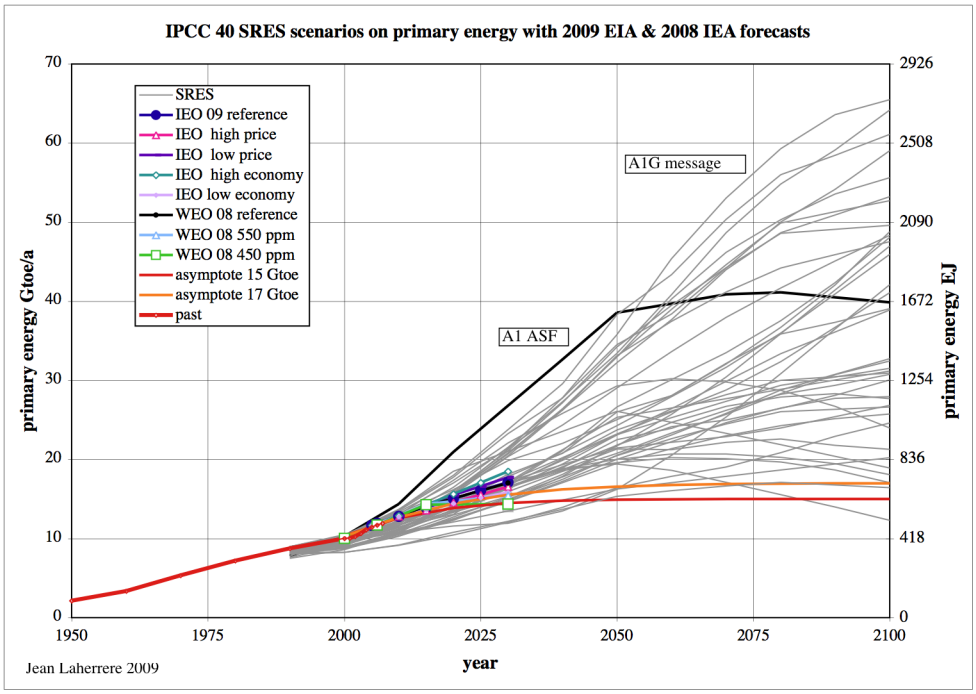
The linearization of PE growth % versus PE is a rough indication of possible trend to estimate the ultimate and the growth varies drastically, in particular in 2004 (5%) but the trend is down towards 16 Gtoe.



The model with an asymptote of 15 and 17 Gtoe/a is displayed with IEA values, but BP values excluding wood and non commercial energy is lower.



SRES scenarios on primary energy displays a huge range in 2100 from 1.2 to 6.5 times the 2000 value (10 Gtoe), when my forecast (15 & 17 Gtoe/a) is about 1.5-1.7. A1 ASF looks out of range!

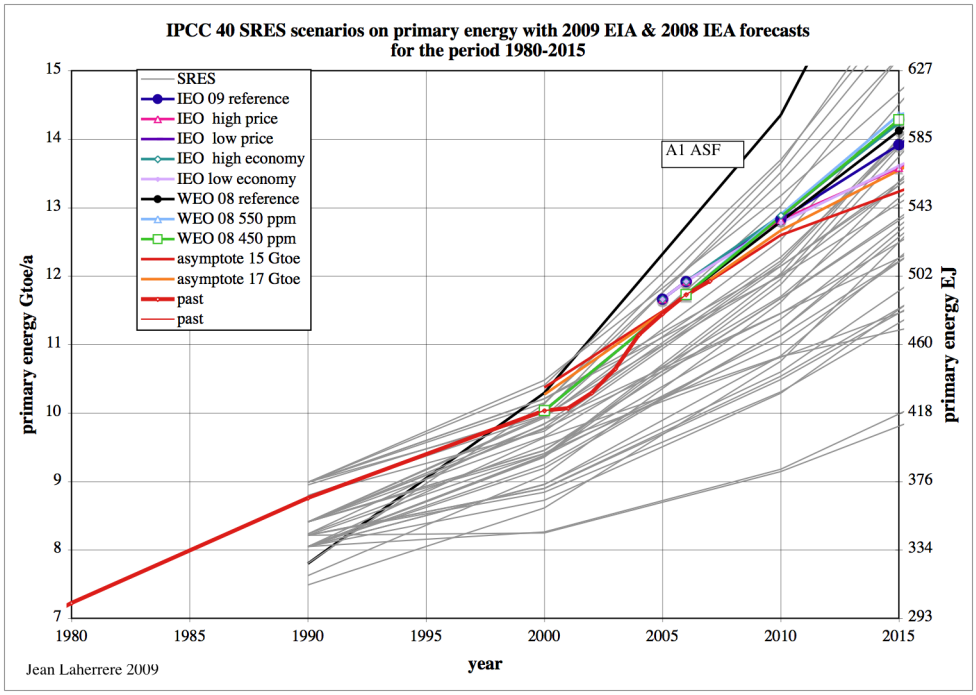


For 2000, the SRES scenarios range is from -18% of 5% of the real value.

PE Gtoe	1990	2000	2010	2020	2030
lowest SRES	7,5	8,2	9	10	14
highest SRES	9	10,5	14	21	27
IEO 09 ref	8,8	10	13	15	17
lowest IEO			13	14	16
highest IEO			13	16	19
WEO 08 ref		10			17
JL 17 Gtoe/a	8,8	10	13	14	16
JL 15 Gtoe/a	8,8	10	13	14	14
error from real %					

lowest SRES	-15	-18
highest SRES	2	5

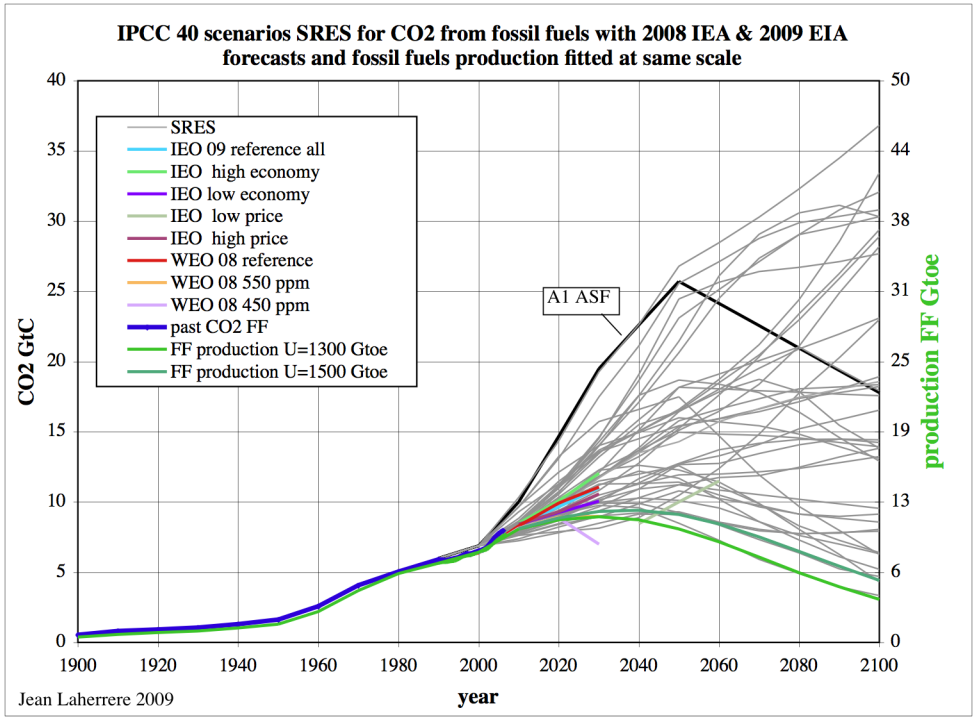
For the1980-2015 period, the SRES look too low



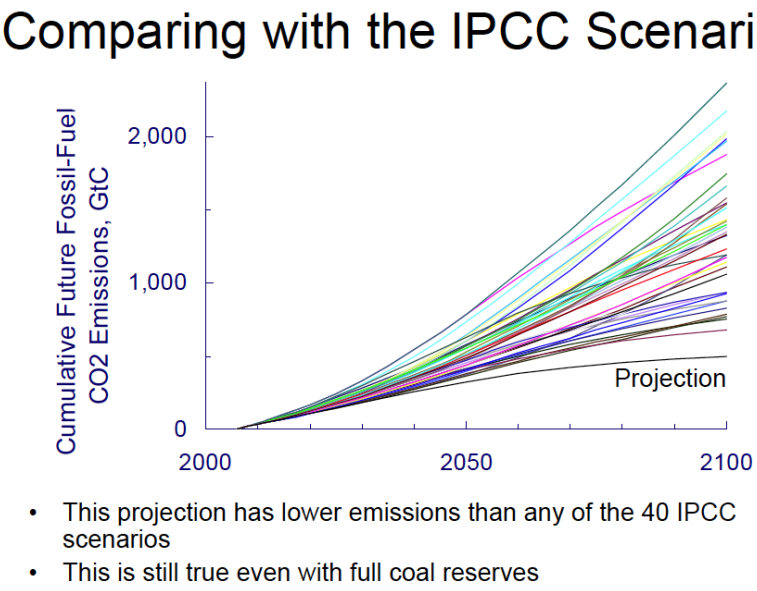
-CO2 emissions from fossil fuels (FF)

It is surprising to see SRES scenarios in 1990 and 2000 varying largely for fossil fuels when they are constant for CO2 at 6 & 6,9 GtC for fossil fuels and 7,1 & 8 GtC for total CO2 (18% higher in 1990 and 15% higher in 2000 of the real values). It is obvious that there is little correlation between CO2 FF emissions and fossil fuels production, because these scenarios are storylines and the story of CO2 FF emissions is different from the story of fossil-fuels scenarios!

The SRES scenarios graph looks like a drastic break compared to the past since 1900, much more drastic than shown on the primary energy range.



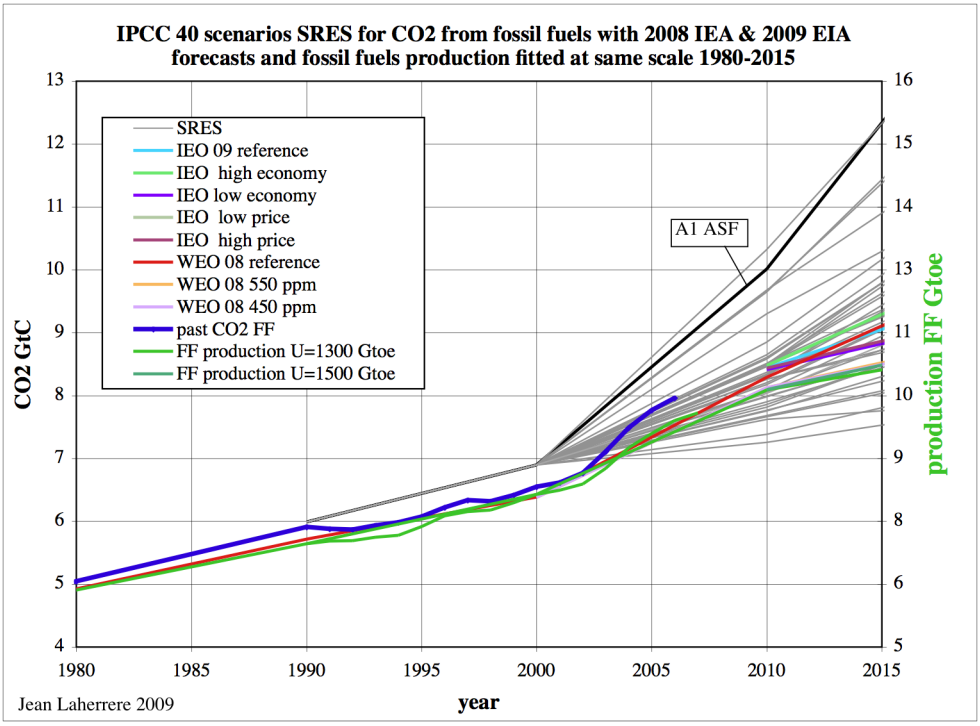
J.W. Murray UW School of oceanography “Peak oil and climate change” 2009 shows a graph of cumulative (not annual) FF CO2 emissions where projection is also outside the SRES range:



SRES FF CO2 values for 1990 and 2000 are 5% & 8% higher than real values.

FF CO_2 GtC=0,27 $GtCO_2$	1990	2000	2010	2020	2030
lowest SRES	6,0	6,9	7,3	7,8	8,1
highest SRES	6,0	6,9	10,3	14,7	19,5
IEO 09 ref all	5,9		8,4	9,7	11,0
lowest IEO			8,4	9,2	10,1
highest IEO			8,5	10,1	12
WEO 08 ref	5,7	6,4	8,3	9,9	11,1
JL 1500 Gtoe	5,6	6,4	8,1	8,9	9,3
JL 1300 Gtoe	5,6	6,4	8,1	8,7	9,0
error from real %					
lowest SRES	5	8			
highest SRES	5	8			

The 1980-2015 period shows that the SRES range is centred on official forecasts after 2005.



In the following graph, Convery et al (2003) «*Achieving Behavioural Change - Policy Instruments and the Management of Climate Change*» Chapter 3 Emissions Baselines http://www.esri.go.jp/jp/prj-rc/kankyou/kankyou14/03ucd.pdf added a probabilistic (?) range from a literature review (showing that SRES scenarios are far from being probabilistic) and they explained that A1 ASF was kept to fit to 1990 scenarios. Their median looks in line with present official forecast up to 2030.

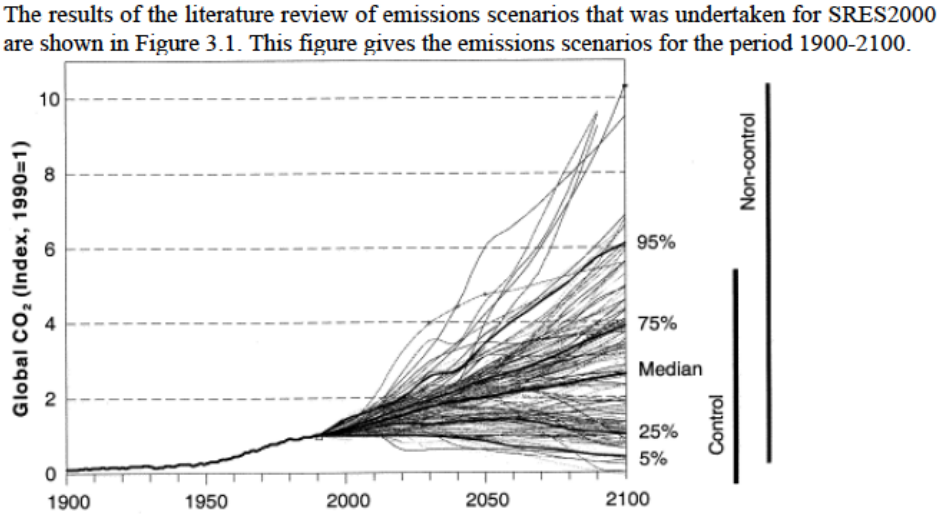
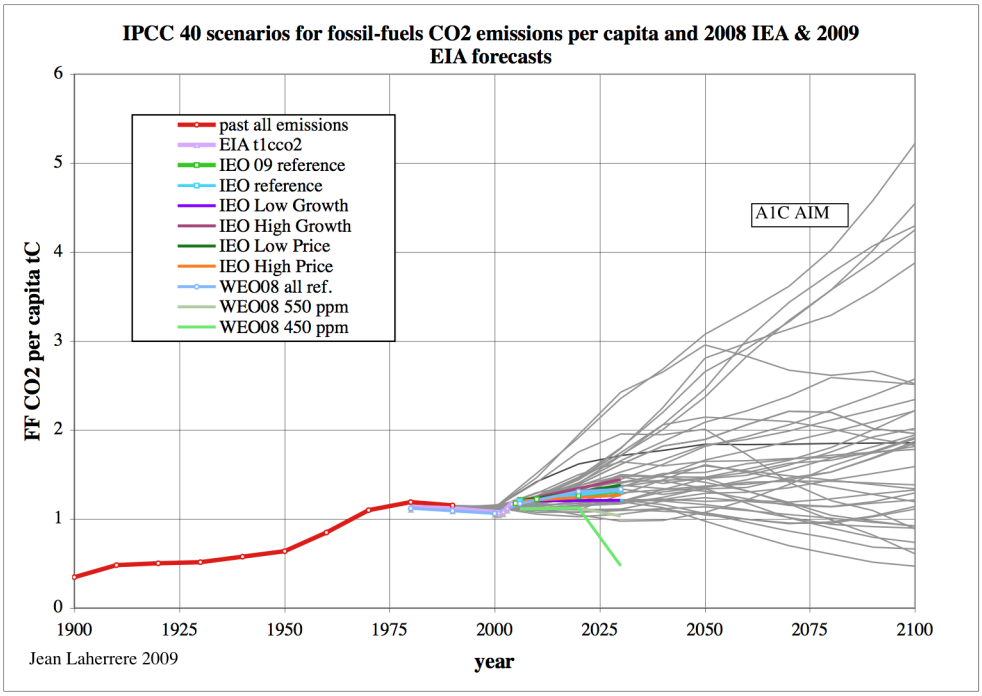


Fig. 3.1. Global carbon emissions, historical development, and scenarios, in GtC per year.

One of the computer models utilised in SRES2000 was the ASF model. This was the model used to generate the first and second IPCC emission scenarios in 1990 and 1992 and hence a comparison is possible between all three IPCC emissions scenarios. The SRES 2000 scenarios that were quantified by ASF are named IS99. The model uses regional GNP/capita growth, ultimately recoverable fossil fuel resources, supply-side and energy-use energy efficiency, the availability and price of renewable energy resources, terrestrial carbon sinks to quantify the emissions scenarios that result from the four storylines.
I have not found much data on IS99 on the web.

-FF CO2 per capita

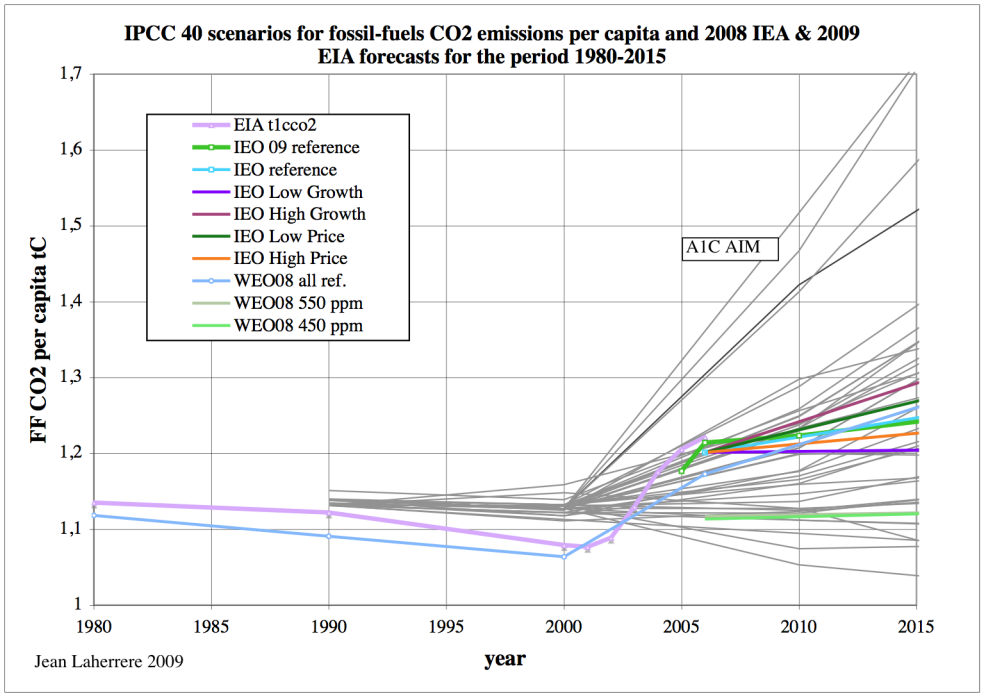
For each SRES scenario it is easy to obtain the FF CO2 per capita by dividing FF CO2 by SRES population. The graph of SRES scenarios shows that the plateau from the past 30 years is broken by the intensive FF scenarios, in particular A1 ASF.
FF CO2 SRES values for 1990 and 2000 were constant, but SRES population values vary, then the FF CO2 per capita values vary.



SRES value for 2000 is from 6 to 9% higher than the real value.

FF CO2 capita tC	1990	2000	2010	2020	2030
lowest SRES	1,13	1,12	1,1	1,1	1,1
highest SRES	1,14	1,16	1,5	1,9	2,4
IEO 09 ref	1,12	1,08	1,2	1,3	1,3
lowest IEO					1,2
highest IEO					1,4
WEO 08 ref	1,09	1,06		1,3	1,3
error from real %					
lowest SRES	4	6			
highest SRES	5	9			

The 1980-2015 period shows that CO2 per capita was decreasing from 1980 to 2000, but sharp increase up to 2006 and slow increase according to IEO & WEO.



-**New scenarios for AR5 (2014?)**

IPCC has realized that the 40 SRES energy scenarios were too many and much too high, so they decided to replace them by a set of 4 "Representative Concentration Pathways" RCP expressed in radiative forcings in watt per square meter (W/m2). The first range was from 2.5 W/m2 to 8 W/m2 (BAU)

But it is in fact the same storylines, by converting few SRES in RCP, just eliminating the highest one like A1, concentrating on the one which leads to an increase of 2°C in 2100.

"*IMAGE and MESSAGE Scenarios Limiting GHG Concentrations to Low Levels*" Rao et al

1.1 Current status of the work

Under Framework Contract ENV.C5/FRA/2006/0071 the Commission requested the development of global scenarios that have a high probability of meeting 2 degrees.

http://www.iiasa.ac.at/Research/ENE/IAMC/docs/RCPP-Report.pdf March 2009

It is strange to choose a scenario by fixing the result and not trying to rely on facts (but on goals).

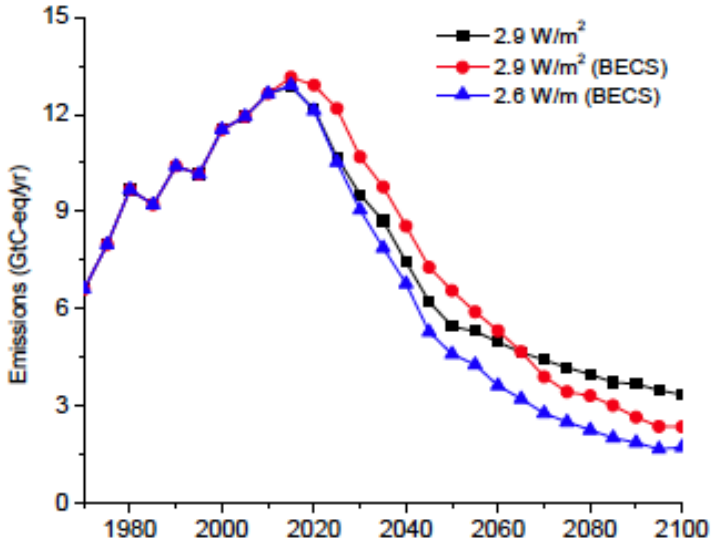
Weyant et al April 2009 "*Future IPCC activities: new scenarios*" "*Report of 2.6 Versus 2.9 Watts/m2 RCPP Evaluation Panel*"

http://www.ipcc.ch/meetings/session30/inf6.pdf http://www.iiasa.ac.at/Research/ENE/IAMC/docs/RCPP-Report.pdf

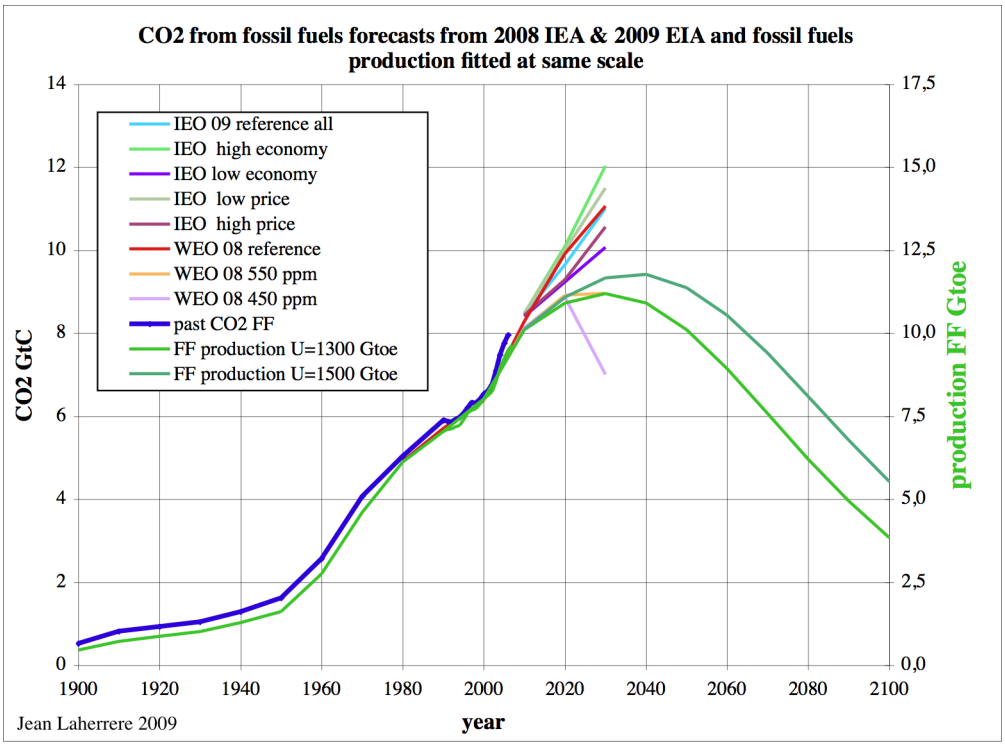
Table 3.2: Climate Indicators

Scenario Category	Radiative Forcing in 2100 (W/m^2)	CO_2-Concentration in 2100 (ppm)	CO_2-eq Concentration in 2100 (ppm)**	Global mean temperature increase above pre-industrial in 2100 (°C)*
A2 Baseline	8.6	900	1430	4.5
B2 Baseline	6.6	640	970	3.6
A2-4.8W	4.6	490	680	2.7
B2-4.8W	4.6	510	680	2.8
B2-3.0W	2.9	370	490	1.9
B2_2.6W	2.5	340	450	1.7

Figure 4.6 Emissions in 2.6 and 2.9 W/m^2 scenarios

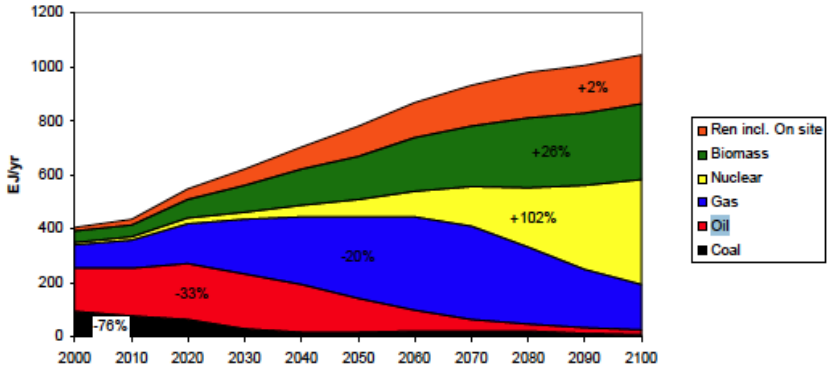


This above graph for 2.6 & 2.9 W/m2 shows a peak of emissions at 13 GtC in 2020 when IEO and WEO forecasts are at 10 GtC in 2020. The so-called lowest scenario at 2.6 W/m2 is much higher than IEA and EIA forecasts, but IPCC does not care much about IEA data or forecasts!



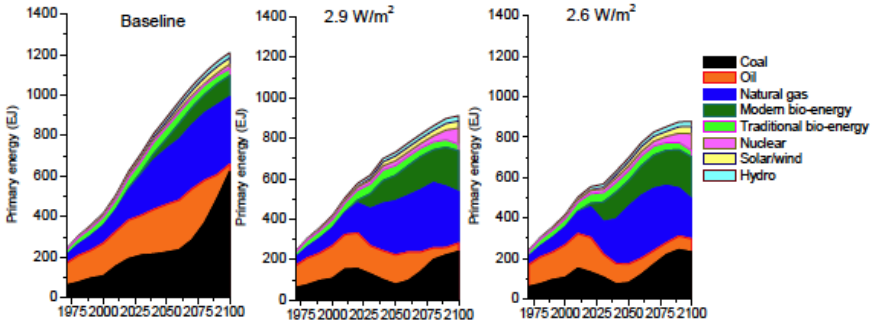
In chapter 3.4 (Mitigation profile) the primary energy graph for B2-2.6 displays an unrealistic profile for coal, being reduced to about 25 EJ in 2030 and close to zero in 2100, when EIA and EIA forecasts are about 200 EJ, even the WEO 450 ppm forecast is 100 EJ! But nuclear is the largest source in 2100, larger than gas.

Figure 3.5: Primary Energy by Fuel in B2-2.6 (numbers in shaded areas indicate the % change compared to the baseline, cumulative 2000-2100)



But in chapter 4.3 the 2.6 W/m2 displays a new peak of coal in 2100 and nuclear smaller than gas. I am lost! There is no synthesis and no explanation of the discrepancy between graphs.

Figure 4.8. Energy use in the baseline and the 2.9 and 2.6 W/m^2 scenarios.(SW=Solar and wind)



In this IPCC April 2009 RCPP report, there is not a word on IEA (WEO 2008 alternatives scenarios are titled 450 ppm and 550 ppm, aiming to answer climate change by reducing temperature increase to 2°C and 3°C) or EIA IEO 2008 forecasts.

However in the IPCC Sept 2007 expert meeting report "*Towards new scenarios for analysis of emissions, climate change, impacts and response strategies*" IEA Chief Economist Fatih Birol was reported in the contributing authors. http://www.ipcc.ch/pdf/supporting-material/expert-meeting-report-scenarios.pdf

It is said in this report:

The Panel asked the expert meeting to consider:

• Comparability of scenarios to serve the various user communities;

*• The results of scenario activities undertaken by the World Bank, the Food and Agriculture Organization (FAO), the Organisation for Economic Cooperation and Development (OECD), the **International Energy Agency (IEA)**, the World Meteorological Organization (WMO), and the UN Environment Programme (UNEP), and the possible future involvement of these organizations in scenario development;*

• Transparency and openness of the scenario development process; and

• Increased involvement of experts from developing countries and countries with economies in transition in the scenario development process.

This recommendation was forgotten in 2009.

In the preface:

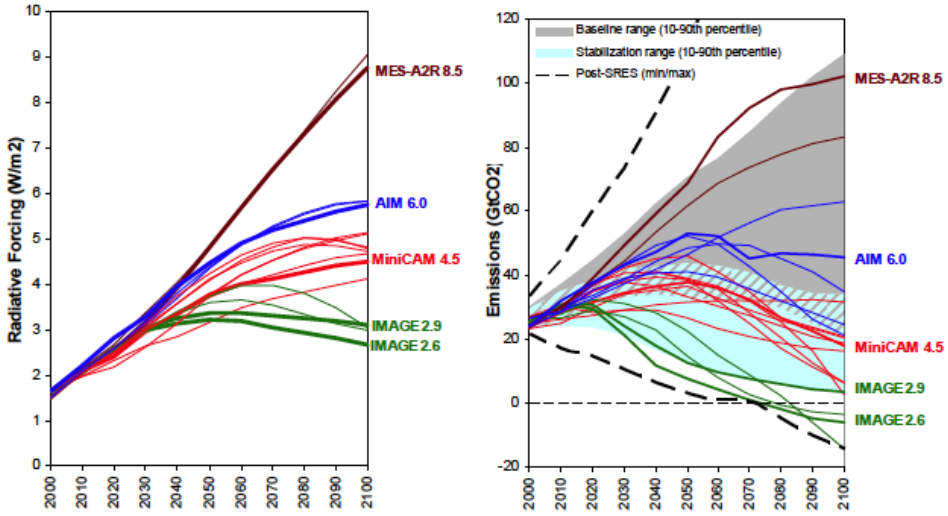
The expert meeting conditionally recommended that the lowest radiative forcing pathway available in the literature from this class of models – IMAGE 2.6 – be used as one of the RCPs because of the strong interest of participating representatives of the policy community. But because this radiative forcing pathway has not been replicated by other models in this class of IAMs, the Steering Committee requested that the Integrated Assessment Modeling Consortium (IAMC) form an evaluation panel to ensure that the scenario is scientifically suitable for use as an RCP.

Table 1. Types of representative concentration pathways.

Name	Radiative Forcing[1]	Concentration[2]	Pathway shape
RCP8.5	>8.5 W/m^2 in 2100	> ~1370 CO_2-eq in 2100	Rising
RCP6	~6 W/m^2 at stabilization after 2100	~850 CO_2-eq (at stabilization after 2100)	Stabilization without overshoot
RCP4.5	~4.5 W/m^2 at stabilization after 2100	~650 CO_2-eq (at stabilization after 2100)	Stabilization without overshoot
RCP3-PD[3]	peak at ~3W/m^2 before 2100 and then decline	peak at ~490 CO_2-eq before 2100 and then decline	Peak and decline

These RCP are taken from the old SRES models

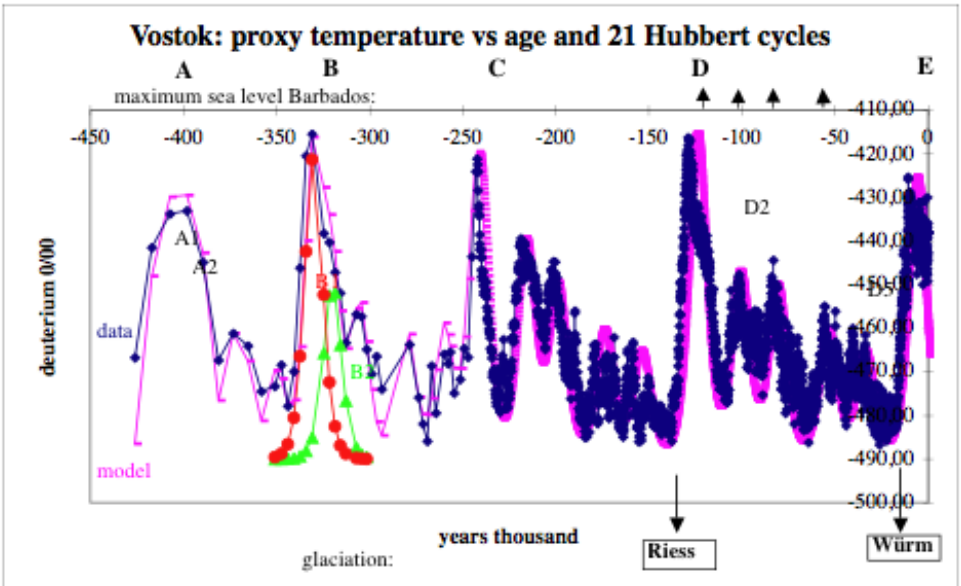
RCP	Publication – IAM
RCP8.5:	Riahi et al. (2007) – MESSAGE
RCP6:	Fujino et al. (2006) – AIM[12]
RCP4.5:	Clarke et al. (2007) – MiniCAM[13]
RCP3-PD:	van Vuuren et al. (2006, 2007) – IMAGE



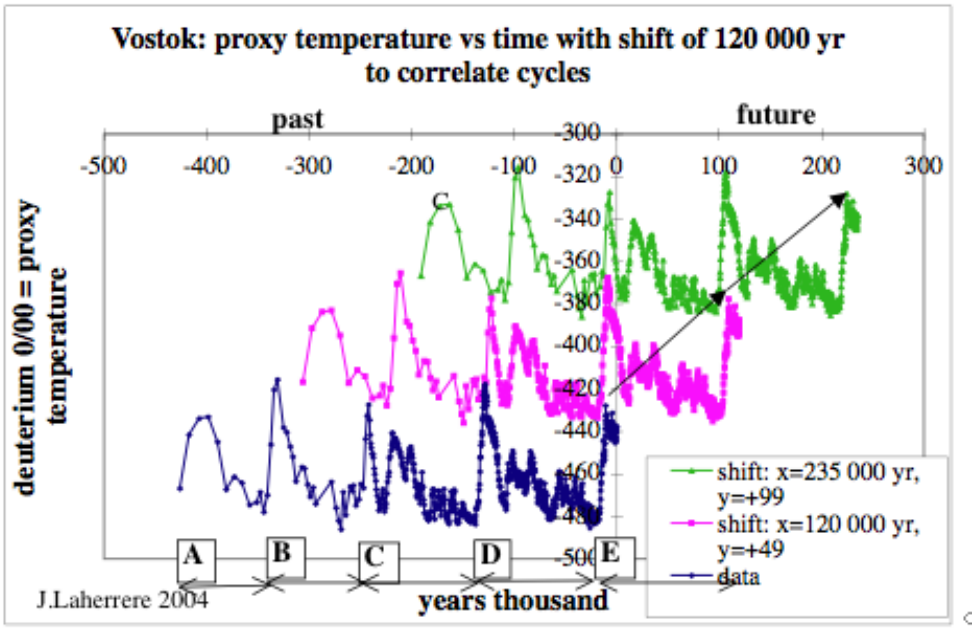
In table II.1 the instructions are:
Four RCPs will be produced from IAM pathways available in the published literature: one higher RCP in which radiative forcing reaches ~8.5 W/m2 by 2100 and continues to rise for some amount of time; and two "intermediate pathways" in which radiative forcing is stabilized at approximately 6 W/m2 and 4.5 W/m2 after 2100, and one lower RCP in which radiative forcing peaks at approximately 3 W/m2 before 2100 and then declines.
In this 2007 IPCC report to prepare new scenarios, out of 155 pages, the word energy (associated to production or emissions) was only used about 12 times, oil only 4 times with oil palm, oil prices, conventional oil and oil shocks, nothing on peak oil! Not a word in the chapter coordinating with stakeholders p83
The 4 new scenarios of RCP seem to be a remake of some SRES ones without knowing what energy is involved in them. It is again some storylines to fit the goal to get a 2°C for the lowest, without trying to find that the reality could be less!
IPCC forecasts that 2100 will be much warmer than now, yet it is not based on real data but storylines. It reminds the Y2K bug or the fear of an apocalyptic year 1000!

-**Simple modelling by shifting past cycles**
IPCC TAR & AR4 reports are a compilation of about two dozens models, both using the same obsolete and unrealistic energy scenarios, with no fit with the past. Modelling requires large computers and several months to get huge results (40 TB).
Few modellers try to simply look at the past to see if cycles exist.

Life is made of cycles: day, year, astronomical cycles (Milankovitch), sun cycles.
In more 10 years, trying to model oil production, I have studied the temperature data (1999 Petit data) from the Vostok ice cores and I was amazed to be able to very easily model Vostok proxy temperatures within 21 cycle models of same width (Laherrere 2007 part 1 graph of 1999 "Thoughts of a geologist-geophysicist on climate change and energy forecast" - FIG Saint Dié - 6 October in 3 parts http://aspofrance.org/texts/Not-Aspo, http://tinyurl.com/9m23p3)

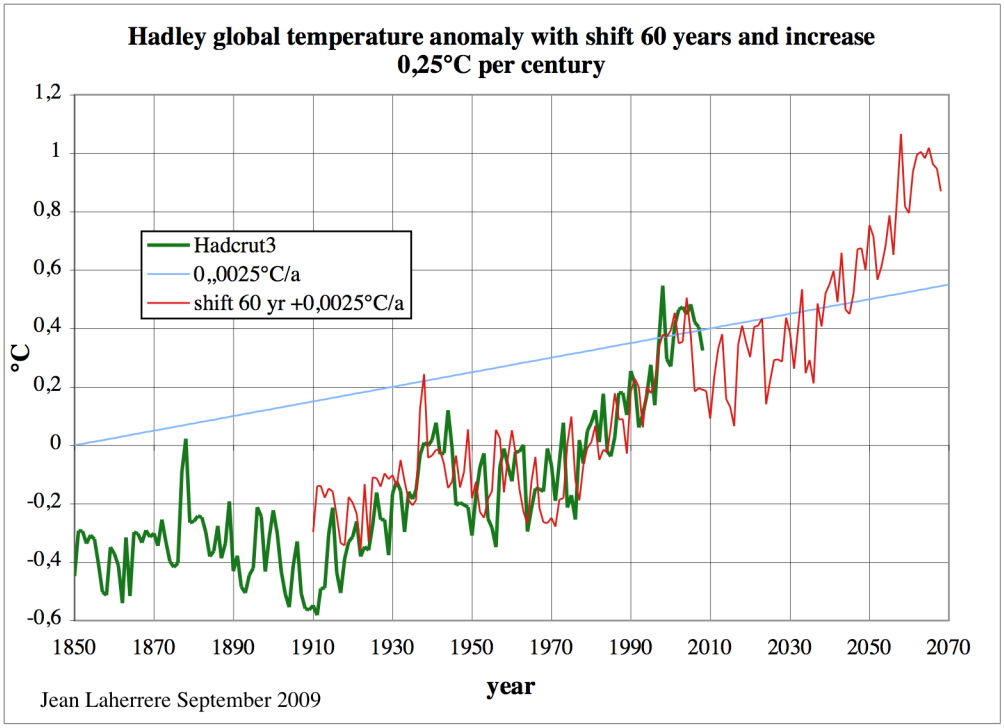


Then I realized that the best forecast is to shift the past until you find a good fit.
For Vostok, the shift was 120 000 years. The first shift gives a good fit for the last 100 000 years and the second shift for the last 50 000 years. So the two shifts should give a good forecast for the next 50 000 years. The interglacial period will end in a few thousand years and we will return into a glaciation.



Temperature has been recorded (http://www.cru.uea.ac.uk/cru/data/temperature/hadcrut3gl.txt) in Hadley Center since 1850. In 1975, Newsweek was forecasting a return towards glaciation because of cooling since 1945. It was the contrary, because of a short-term cycle of around 60 years (see Russian Academy of Sciences). There also seems to be a long-term cycle with the Medieval Warm cycle, followed by the Little Ice Age and now the present global warming (cycle of 1500 years for S.F. Singer 2007 «Unstoppable global warming every 1500 years» Rowman & Littlefield pub.).

The following graph displays a good fit since 1910, with a shift of 60 years and a long-term increase of 0.25°C per century.



If this correlation stands, the world temperature will stay on a plateau for the next 20 years.
I have proposed to some AGW strong believers to bet 1000 € that temperature in 10 years will be the same as today. None has taken my bet! Keenlyside et al 2009 ("Advancing decadal-scale climate prediction in the North Atlantic sector" Nature 453) forecast no temperature increase for the decade 2005-2015, when the Russian Academy of Science forecasts cooling.
Temperature in 2070 could be higher, but not because CO2, but a long-term cycle starting from the Little Ice Age!

-Conclusion

It is amazing that the IPCC 2007 conclusions of a global warming of between 2 and 4°C in 2100 is accepted by most officials as the truth and that deniers are considered as unscientific people, when these results from models using are based on unrealistic and obsolete storylines called SRES scenarios.
The wishful thinking SRES used in the 2007 report display variable values for 1990 and 2000 (from -23% to 29% from real values for oil).
Whatever the quality of the model (modellers admit that water is a problem and the 23 models present grid is about 300 km wide, too large to handle clouds) the result of a model depends upon the quality of the data put into it, so

Garbage In, Garbage Out = GIGO

The problem is that GIGO is turned into Garbage In, Gospel Out, because it comes from models that few understands (like the finance traders models which led to the present financial crisis).
It is amazing that IPCC refused to change the 2000 SRES scenarios for the 2007 AR4 report despite critics on the energy scenarios. But changing the scenarios should imply recognizing that it was wrong in 2000.
IPCC reports led the medias to make the CO2 the main cause of climate change, but the result of the study of the Antarctica ice cores, which is agreed by all scientists, is that since 800 000 years the driver is the temperature and CO2 follows with a lag of about 1000 years. When temperature increases, CO2 solubility in ocean decreases and CO2 goes into atmosphere.
The new proposed scenarios RCP for 2014 AR5 have a lowest radiative forcing of 2.6 W/m2, which is higher than IEA forecasts. This minimum RCP is designed to get 2°C increase in 2100!

AR5 will then present a minimum 2°C increase: it is not science, it is politics!
IPCC is an intergovernmental group where unanimity is required (so many quit). The AR4 Summary for Policy Makers (SPM) was held in Paris in February 2007, involving mainly politicians. The technical reports were only published a few months later in order to fit them to the decisions of the SPM.
The IPCC reports are now considered the truth because they received the Nobel Peace Prize in 2007 (as Al Gore), yet the Peace Prize is awarded not by scientists in Sweden, but politicians (Storting) in Norway.
Arafat received it in 1994. Stalin was nominated in 1945 & 1948 and Hitler in 1938! It is obvious that the Nobel Peace Price has nothing to do with science.
The number of AGW sceptic scientists (see NIPCC and the www.sepp.org site) is as long or even longer than the one of the IPCC scientists (all needing public funding) involved in the report.
Climate change has always been present on earth and homo sapiens was obliged to deal with it, in particular with glaciations. The Medieval Warm Period was warmer than now and Greenland greener, allowing Vikings to breed cows.
Forecasting weather and climate is difficult. The main problem is to save energy because presently energy sources are limited, it is not wise to spend more energy to prevent a climate change coming from unrealistic scenarios, contrary to official energy agencies forecasts.
But climate change policy now involves huge amount of money and many want to make money or finding a job and not to save the Earth.
It is amazing to see that energy production official forecasts are ignored by IPCC and that policy makers are unaware of this discrepancy between reality and inputs of the IPCC models.