YOUR WATER YOUR SAY ACTION GROUP INC.

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Supply and Demand Analysis: Melbourne's Water

Research Conducted by Neil Rankine B.Sc Hons Dip Ed (Monash)
Supported by the Environment and Engineering Working Party – Your Water Your Say Inc
Version 4, April 10th. 2008

Reviewed by Professor Barry Hart (Monash University) *"I believe the information in this document is sufficiently robust for there to be concern over the validity of the case for the desal plant".*

Endorsed by Friends of the Earth.

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WATER - YES!
DESAL - NO!

The Victorian Government's dramatic change of strategy for Melbourne's water supply is based on a false premise

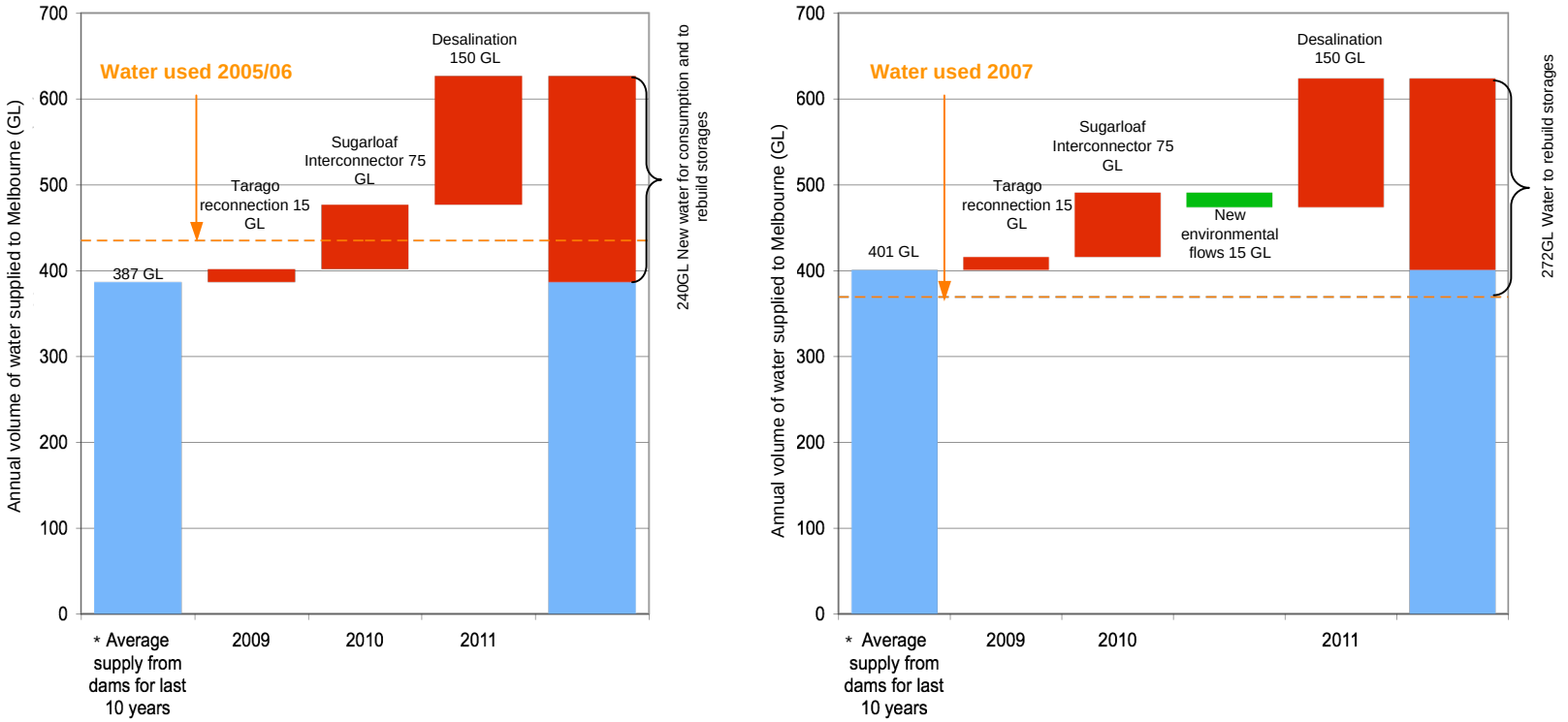
The Victorian government went to the November 2006 election with a well-considered and sustainable water strategy to meet Victoria's water needs to 2055. In June 2007 there was a dramatic turnaround by the same government and Premier Bracks announced that the largest desalination plant in the world would be built on South Gippsland's Bass Coast. Mr Bracks had discounted desalination in 2006 on the grounds that the *'energy generation is enormous, the intrusion on the community is enormous and of course it's extraordinarily expensive*.'

The government's new post election policy called; 'Our Water Our Future, The Next stage of the Government's Water Plan', justified the total reversal on desalination on lower than average, three-year rainfall to 2006. Three years is an extremely small sample to form the basis of a long-term strategy and would not be tolerated by statisticians or scientific modellers. Our document refutes the government's rationale. To gain a clearer picture of future water needs, we use the government's own data from before the election, the latest inflow figures, the CSIRO's most severe climate change and run-off modelling forecasts, and the governments latest population increase projections.

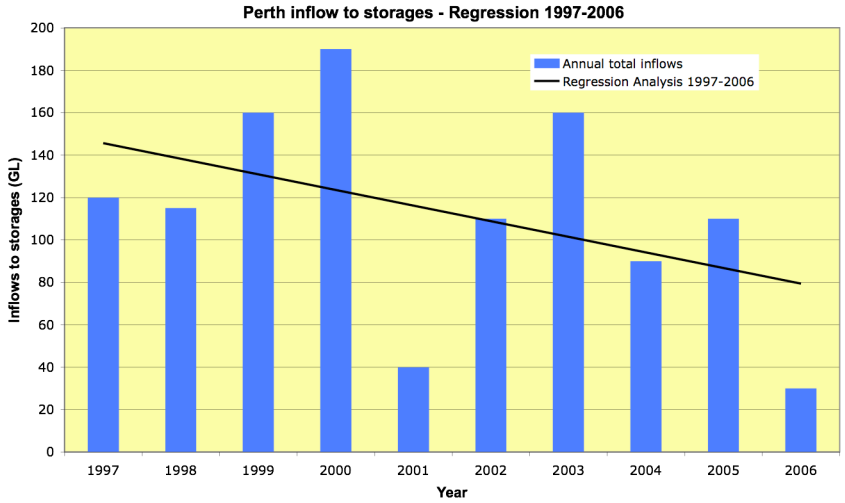
We begin by comparing the 2006 situation, used to justify the change in policy, with 2007 equivalent data (showing the inadequacy of three-year trends). Next, we look at the ludicrously large volumes of excess water supply that would result from the adoption of the desalination option. Finally, we show that the policy put to the people at the last election does indeed provide a good solution to water sourcing into the future, even considering a severe climate change scenario.

2007 consumption figures are used as the base year for comparisons. Conveniently 2007 consumption was close to the government's stated aim of a 25% reduction on 1990's usage by 2015. Domestic consumers have so far made the dramatic water savings, and earlier than expected, industry will catch up, allowing greater domestic consumption. In any case this analysis shows that the dams will build and restrictions be removed even without the desalination factory.

The desalination option was presented as a necessity to build storage levels in our dams after the 2006 dry year. The chart on the left is the one the government published in June 2007, showing consumption above a 10 year average of supply to our four main dams. The same chart, including 2007 consumption figures and incorporating 2007 inflows, shows a different picture. Now, even with 2007 still being a dry year the inflows to our dams are above consumption.

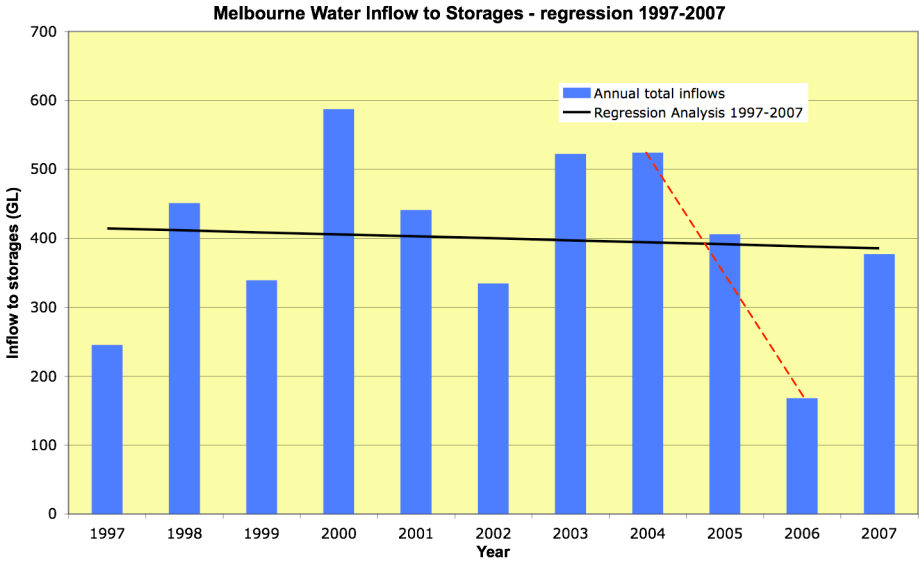


* Note that the label provided for the 10 year average is incorrect, it actually shows average of 10 years **inflows to our 4 largest dams**, not supply **from** our dams. From "Our Water Our Future,The Next Stage of the Government's Water Plan, June 2007".



Why Perth decided they needed a desalination plant - Clear inflow downtrend.
Their trend in total inflows to dams was consistently falling.

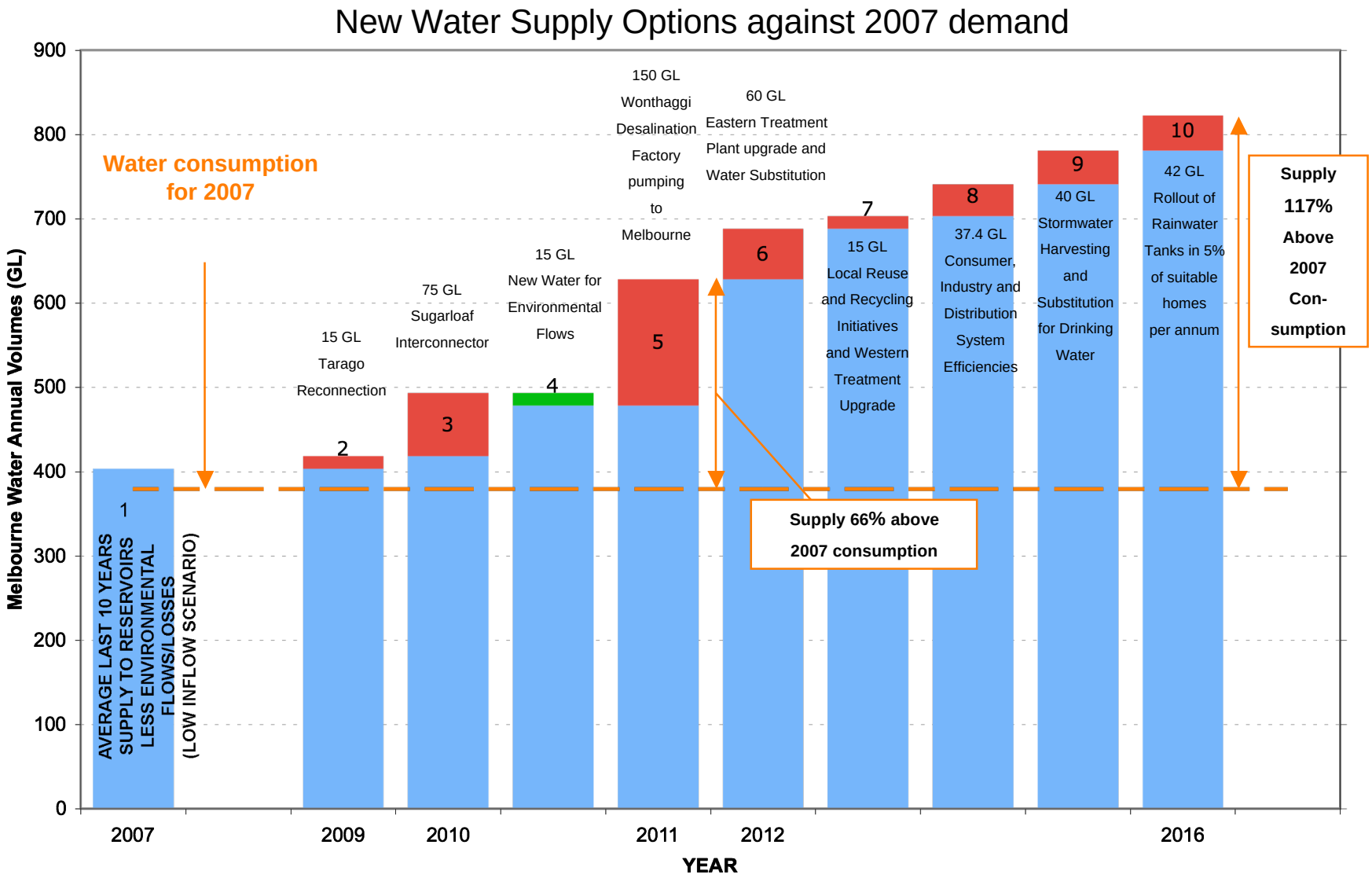
(Ref: Water for Our Cities: building resilience in a climate of uncertainty, A report of the PMSEIC working group)



Why Melbourne doesn't need one on the same analysis - Our ten year, low inflow scenario trend, is much less severe, and we have more options to cover it.
Regression analysis shows the way inflows have behaved and indicate likely future behaviour.

(Ref: Figures supplied by Melbourne Water, Annual Streamflow to major storages 1913 to 2007)

The 2006/07 decision to adopt desalination for Melbourne seems to have been made on the anomalously low 2006 inflow figure. Without any augmentation to supply, and a continuing repeat of the 2004-06 inflows we would slowly eat into reservoir storage. The government has assumed that things could get even worse. CSIRO projections indicate the trend is not likely to be anything like Perth's, but more likely similar to the 1997-2007 regression line above. Melbourne's most severe further inflow reduction possibility works out at 5.9%, 2007 to 2016, according to the latest CSIRO predictions (see references later in this report). Augmentation in needed, but sustainable options will secure Melbourne's supply without an expensive, environmentally damaging and excessive desalination factory.



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References for Chart: New Water Supply Options against 2007 demand

1. Average of last 10 years inflow to Melbourne's four main storages (1998-2007) with an adjustment to include the average balance of other storage inflows, environmental flows, evaporation and other losses for the same period (1998-2007).
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3. Sugarloaf interconnector 75GL, from; Our Water Our Future, The Next Stage of the Government's Water Plan, DSE June 2007 p9.
4. New Environmental Flow 15GL, from Our Water Our Future initiatives (hence a reduction in supply on this chart), others from reallocations, Melbourne bulk entitlement and unallocated reserves. From; Sustainable Water Strategy, Central Region, Action to 2055, DSE October 2006 p7&8.
5. Desalination Factory on coast at Wonthaggi pumping water to Melbourne 150GL (maximum design capacity 200GL), from; Our Water Our Future, The Next Stage of the Government's Water Plan, DSE June 2007 p6.
6. The Victorian Government through DSE, Referral under the Environment Protection and Biodiversity Conservation Act 1999, Referral 2008/3948, Victorian Desalination Project, Section 3.6 state that over 100GL will be produced by 2012, however only 60GL is used in this analysis to be conservative. The government have not stated their desired option for use of this water, or the level of potable return. It is possible that less than 60GL will be directly returned as potable supply, however the extra recycled water supplied will likely provide a component of environmental flows, leaving reservoir storage for other consumption (hence 60GL is conservative).
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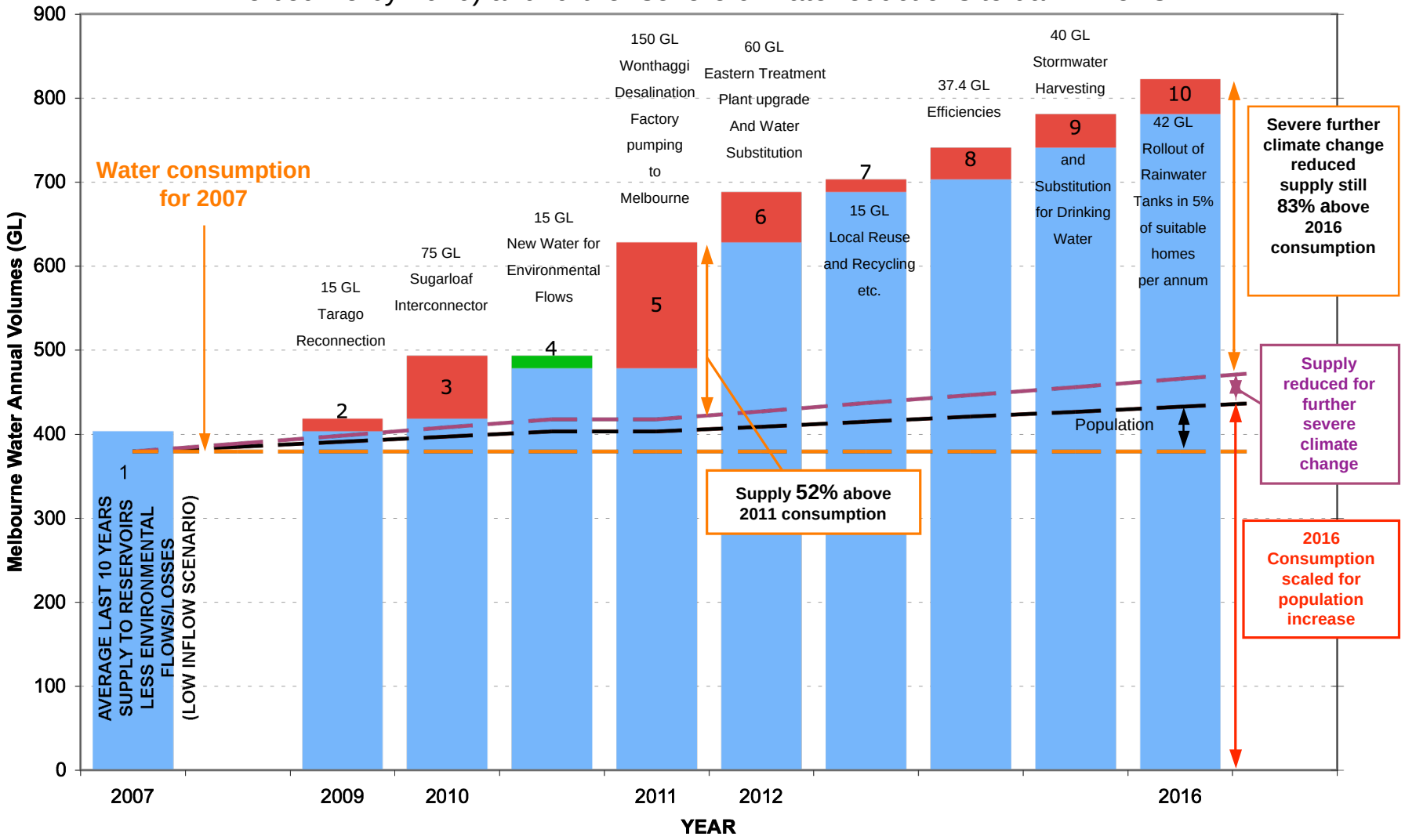
8. Consumer, Industry and Distribution System Efficiencies 37GL, from Sustainable Water Strategy, Central Region, Action to 2055, DSE October 2006 p94. Taking the benefit derived up to 2015 from Action 4.31(3GL) + Action 4.32(21.3GL) + Action 4.34(11.6GL) + Action 4.35(1.5GL) = Total 37.4 GL.
9. Stormwater harvesting and substitution for drinking water, a very conservative figure of 40GL by 2015 is used (the potential is for at least 250GL eventually). Projects identified to date are; 26GL Patterson River to aquifer or Cardinia, and others under 20GL, from "Melbourne Water, Stormwater Recycling Feasibility Study, 8 June 2007". Also in "Sustainable Water Strategy, Central Region, Action to 2055, DSE October 2006"; 2.7GL Voluntary initiatives through O.W.O.F, p58 and 12.5GL Black Rock treatment plant to aquifer storage, p56.
10. Rollout of rainwater tanks in 5% of suitable homes per year (5.25GL/annum, maximum 80% of all suitable households) gives 42GL by 2016, from Marsden Jacobs Associates, The economics of rainwater tanks and alternative water supply options, 11 April 2007.

New Water Supply Options against consumption, with increasing population (4.5+ million for Melbourne by 2020) and further severe climate reductions to dam inflows.



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References for Chart: New Water Supply Options against consumption with increasing population (4.5+ million for Melbourne by 2020) and further severe climate change reductions to dam inflows

Both population increase and further reductions in rainfall due to climate change will have an effect on the supply/demand balance for Melbourne;

1. Melbourne's population is assumed to increase to 4.5 million by 2020 in line with a recent announcement made by Premier Brumby based on Treasury analysis of 2006 census figures, similar predictions are being made by Bob Birell:

   J.Brumby, Speech to the UDIA conference, 4 March 2008, p.3

   B. Birrell and Ernest Healy, CPUR Bulletin, Melbourne's population surge, Monash University, March 2008.

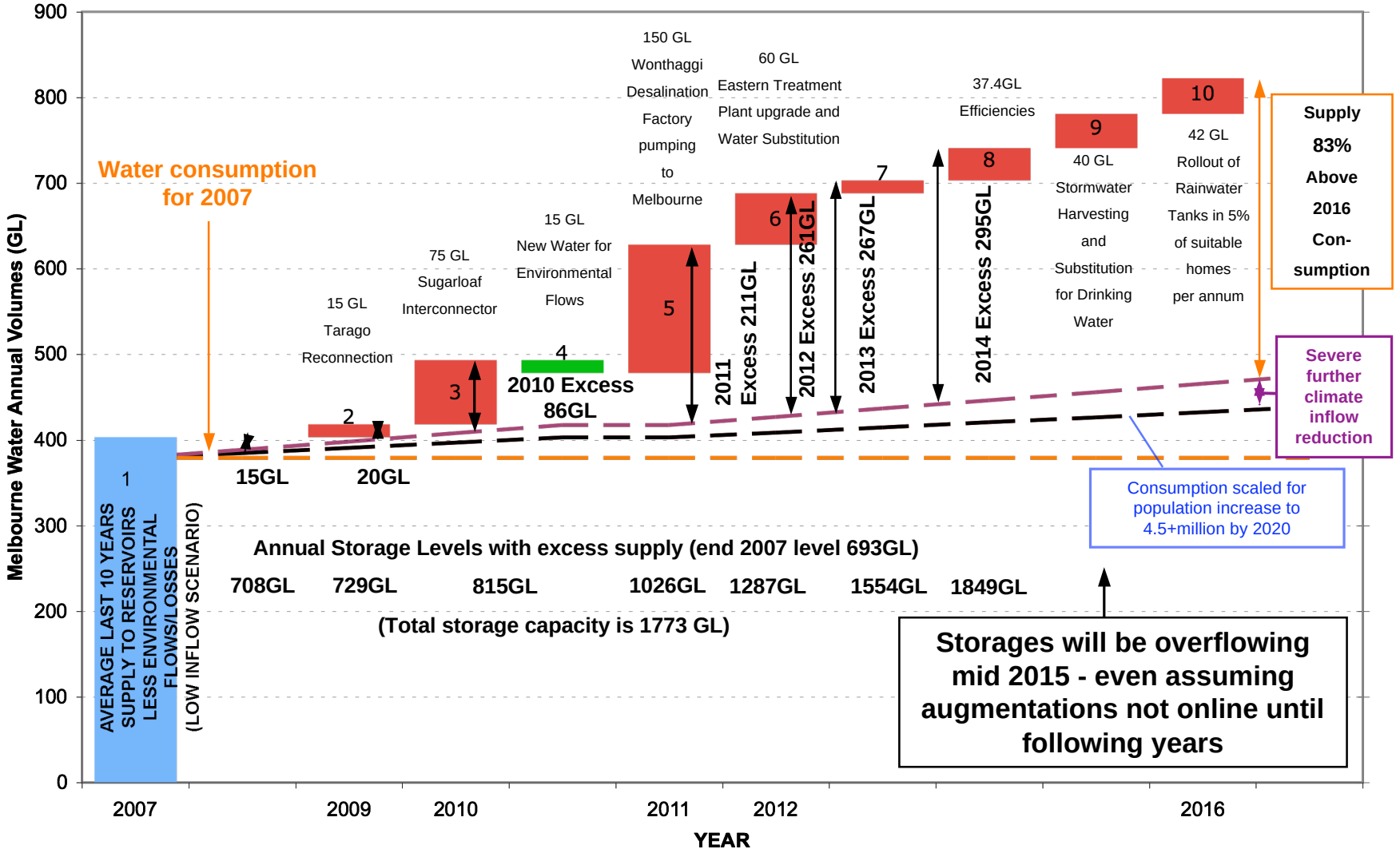
   Scaling this from 2007 to 2016 gives a population increase in that time of 14.1%. Hence consumption is scaled over this time to give a 53.44GL consumption increase due to population increase by 2016.

2. Climate change may lead to still further reductions in rainfall and consequently even greater reductions in runoff to reservoirs. The CSIRO has provided 11% as being the currently accepted "severe climate change" reduction possibility, for average long-term streamflows into Melbourne's reservoirs, by 2020. From: "Melbourne Water Climate Change Study, Implications of Potential Climate Change for Melbourne's Water Resources, CSIRO and Melbourne Water, March 2005", available at: http://www.melbournewater.com.au/content/library/news/whats_new/Climate_Change_Study.pdf. And "Climate Change in Australia, Observed changes and projections, Technical Report, October 2007", available at: http://www.climatechangeinaustralia.gov.au/resources.php

   Assuming the 11% reduction happens from the middle of the last 10 year period, to 2020, the averaged annual inflow reduction would be 3.68GL. This would mean that from 2007 to 2016, in a further severe climate change scenario, total inflows to reservoirs could be up to 33.08GL less than the current 10 year average.

There is still an inordinate supply above consumption, even with a severe, further climate change scenario factored in on top of the already low 10 years of drought inflows.

Even with severe climate induced restrictions to dam inflows
MELBOURNE'S STORAGES WILL BE OVERFLOWING IN 2014 or 2015



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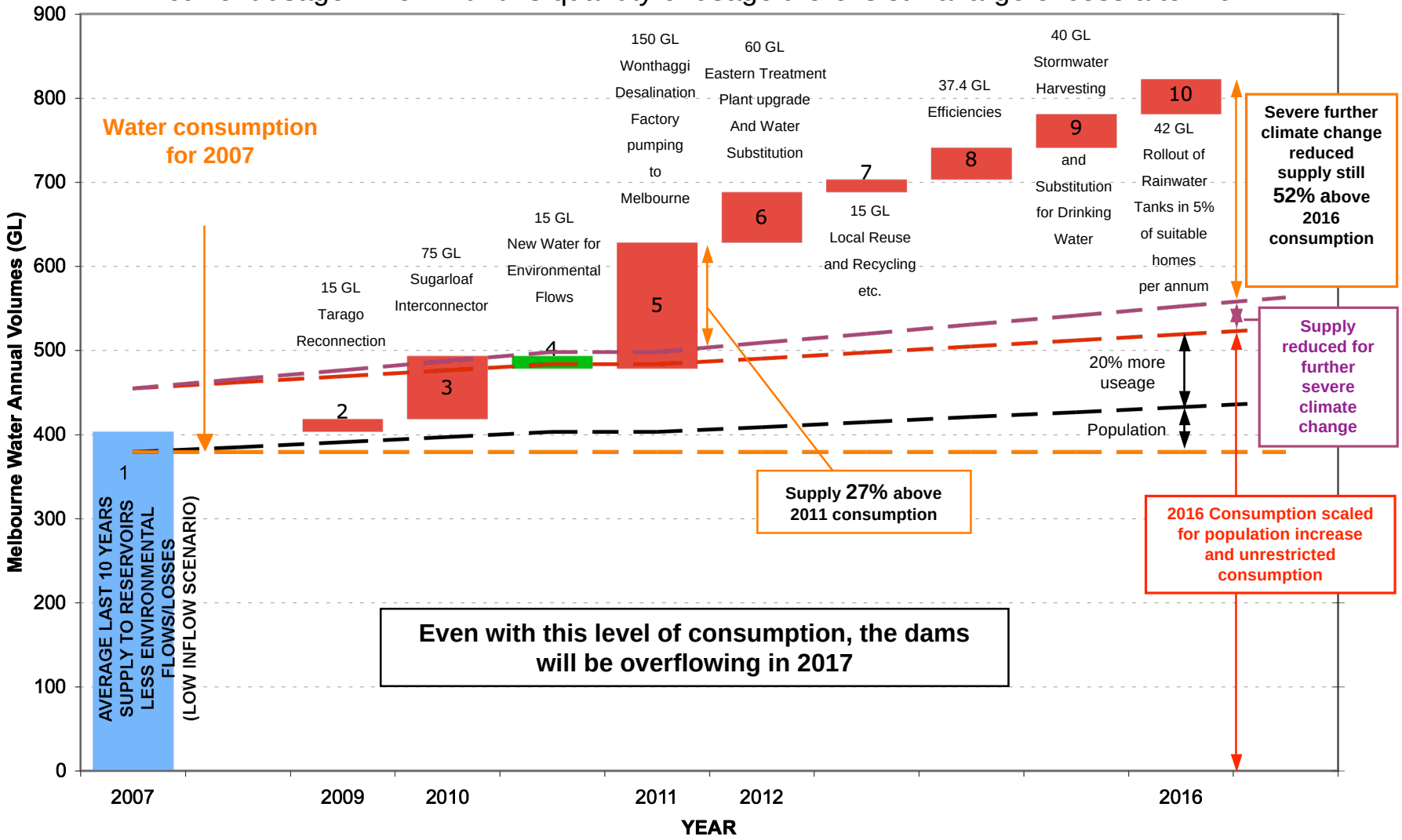
UNRESTRICTED CONSUMPTION might be considered to be a 20% increase in consumption above current usage. Even with this quantity of usage there is still a large excess after 2011.



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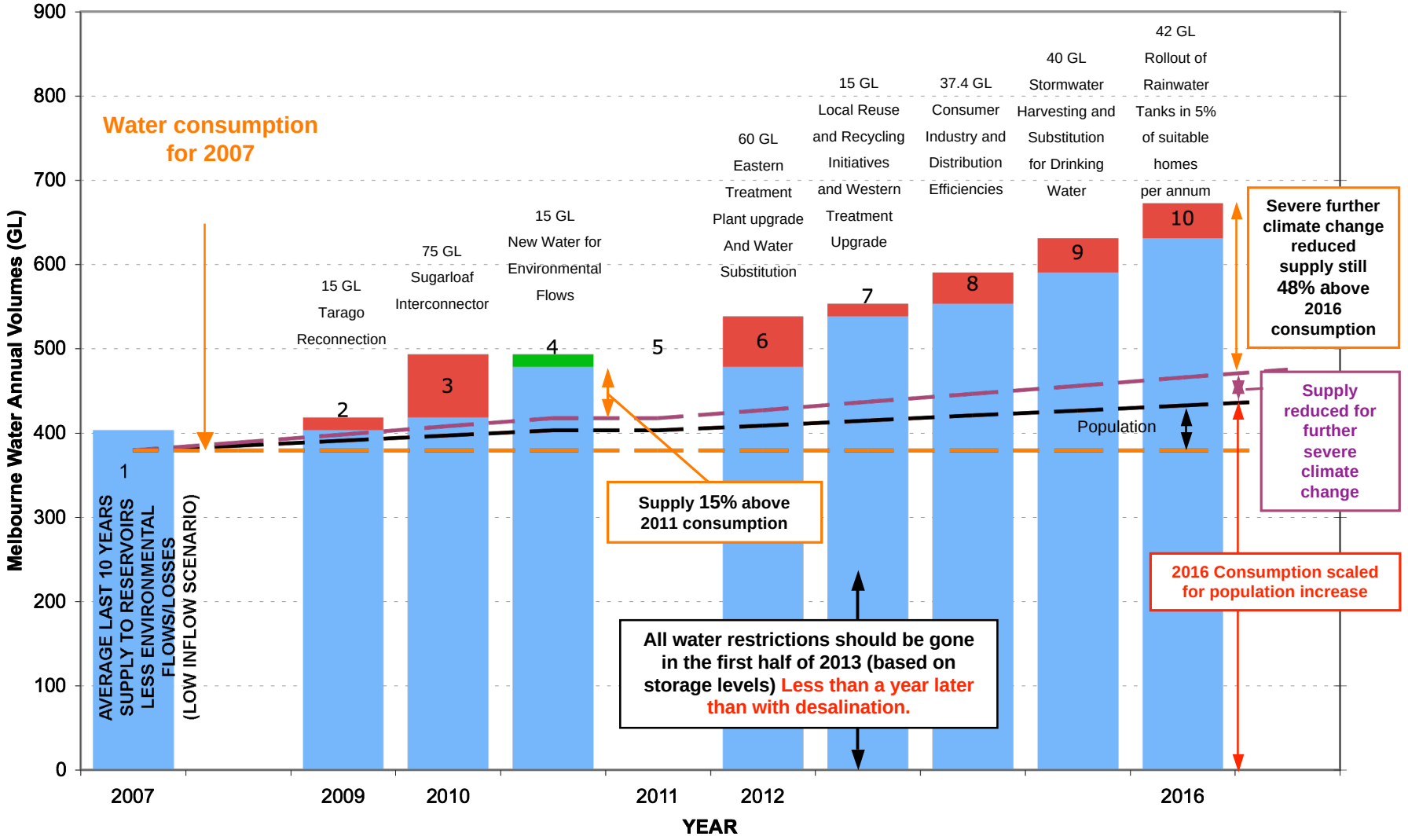
New Water Supply Options against consumption with increasing population and severe climate change reductions to dam inflows BUT WITHOUT DESALINATION.



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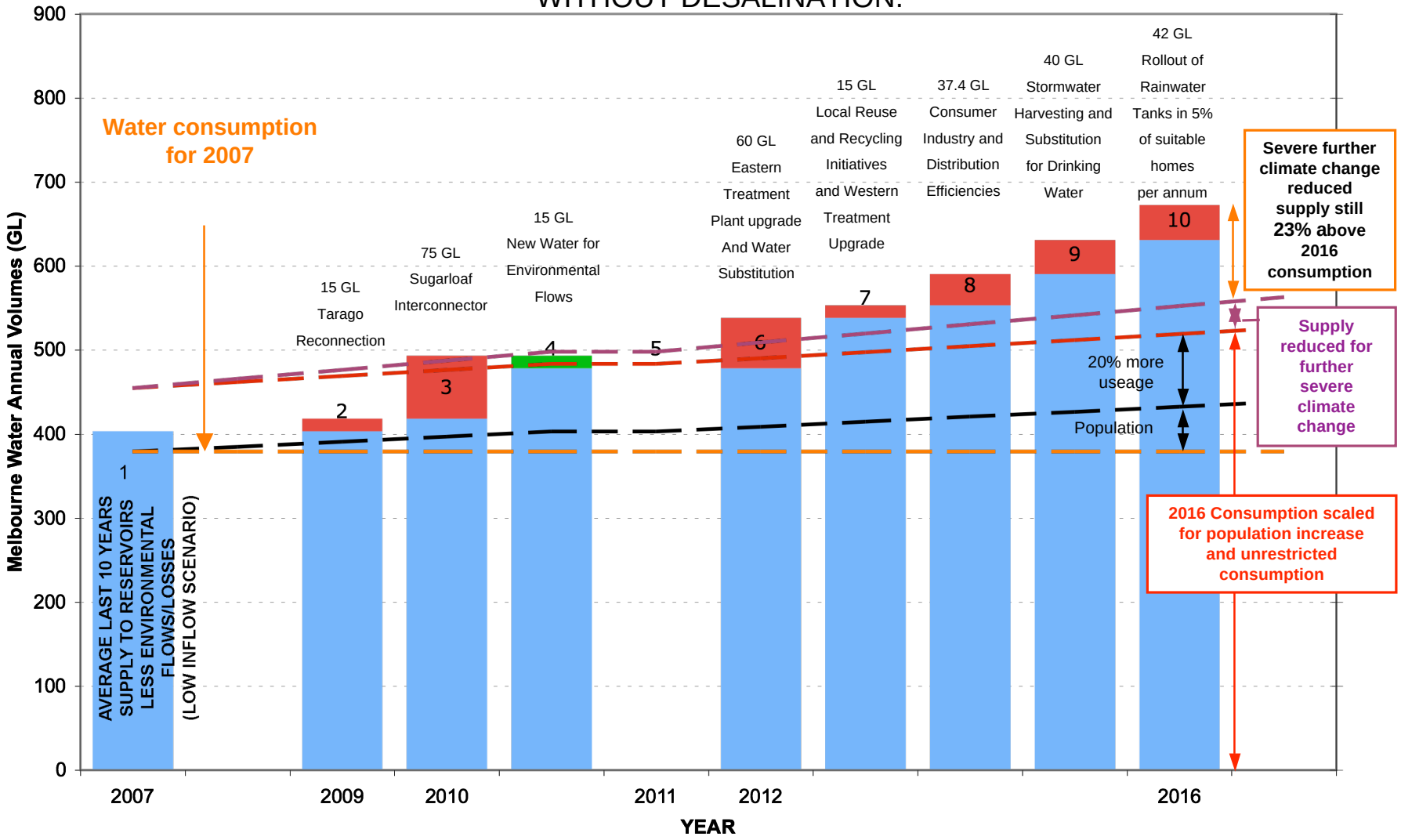

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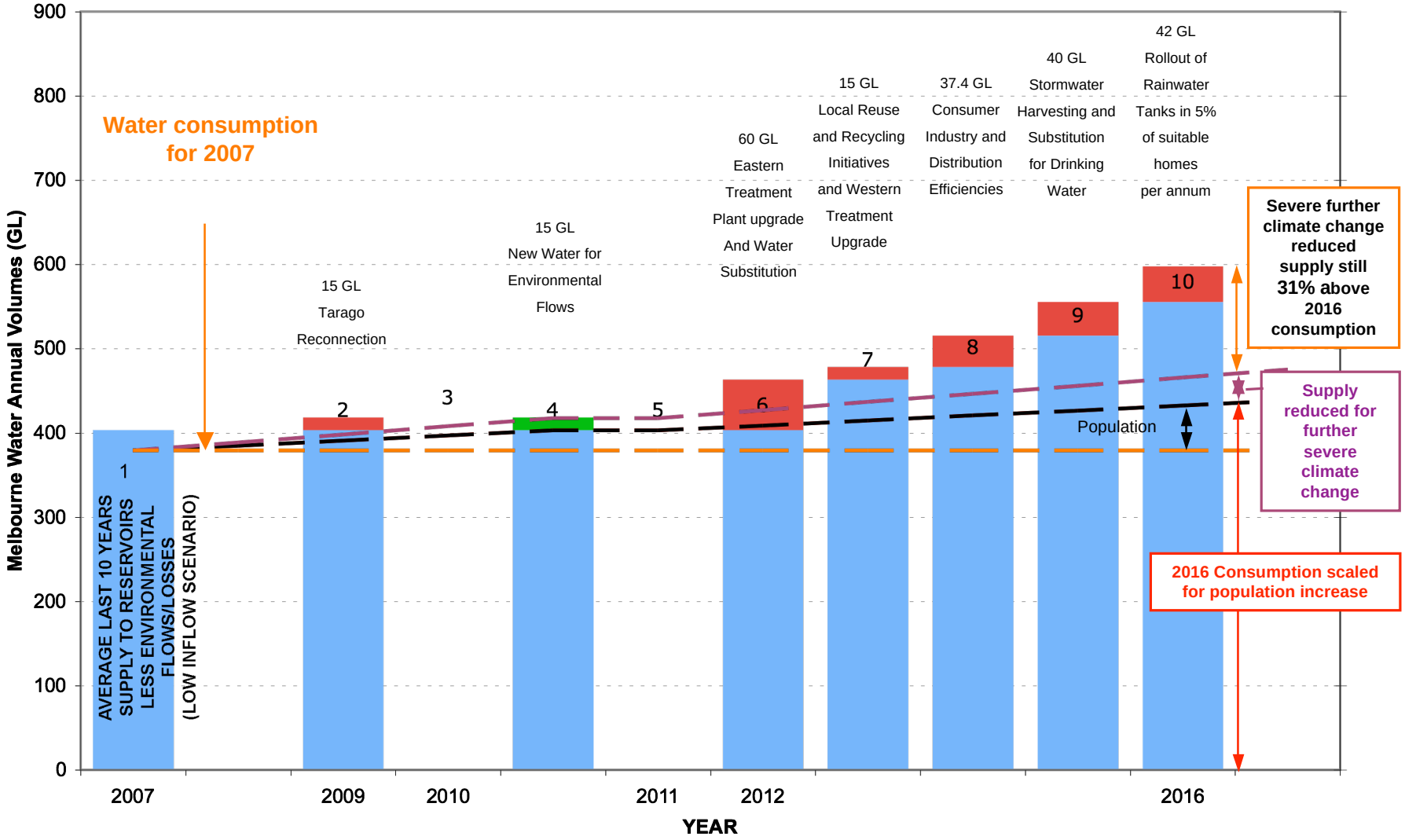
3. Each years population increased consumption is scaled up for 20% more usage. (Unlikely that people would go back to such usage without inducement, especially with increasing cost of water).

There is a small and building excess supply above consumption after 2012, even with a severe, further climate change scenario factored in on top of the already low 10 years of drought inflows, and 20% more usage. And this is without other augmentations that could be implemented (some of these being listed at the end of this report).

New Water Supply Options against consumption with increasing population and severe climate change reductions to dam inflows BUT NO SUGARLOAF INTERCONNECTOR OR DESALINATION.



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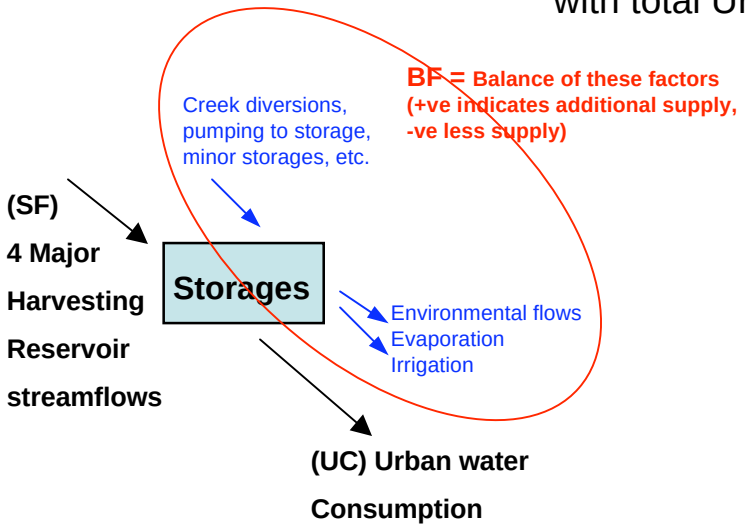
There are still further water sourcing possibilities that have not been included in these charts. They typically have much better environmental outcomes, cost far less and consume far less energy than a desalination plant would per kilolitre supplied. Some examples are:

1. Stormwater capture, and storage in underground aquifers, could provide more than a hundred gigalitres of non potable water that the likes of industry, new subdivisions, parks and golf courses could access through metered bores, to use in place of potable water now used for non drinking use. There are potential benefits in preventing salt ingress to these aquifers.
2. Flood diversions to rivers, e.g. a scheme to divert peek flood flows in the Aberfeldy River, through a 3 kilometer tunnel, directly into the Thomson Reservoir is estimated to be able to supply an average 40 GL annually. There are added benefits of flood damage mitigation in downstream irrigation districts.
3. Water for the Latrobe Valley power stations and the Pulp Mills could be partially sourced from water in the open cut coal mines, and/or from coal dewatering used to improve efficiency of combustion.
4. Desalination of brackish or waste water as opposed to sea water can be done at about 1/3 of the energy cost and can often be done “on site” which avoids the huge pumping energy cost to Melbourne inherent in the Wonthaggi desalination proposal. These can be large or small scale.
5. Scarecity pricing of water, where cost is related to storage levels, would allow consumers to use water if they see a need, however overall consumption would reduce without imposed restrictions.
6. Stopping logging in Melbourne’s catchments. This has the potential to increase inflows to Melbourne’s dams by between 65 and 85 GL annually within 60 years if logging was stopped today. From independent research by Read Sturgess and Associates in 1992 for the Thomson catchment and scaling to include the Upper Yarra catchments.
7. Cloud seeding looks like being much more feasible in the near future.
8. A proposal to pipe water from Tasmania by gravity as far as Bendigo has not received the research its potential would indicate it should have.
9. Further rollout of rainwater tanks on suitable homes and businesses can still source at least a further 42GL by 2024, see previous rainwater reference.

Appendix A:

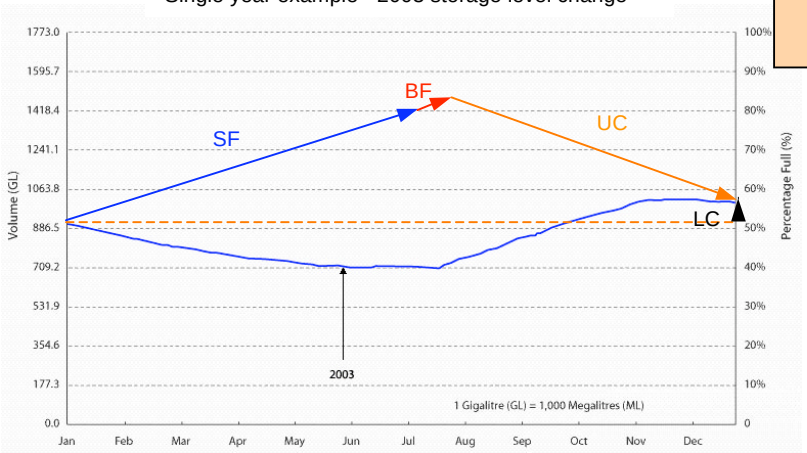
A ‘Balance Factor’ to modify Stream Flow figures, to ensure that when combined with total Urban Consumption, other inflows and losses are accounted for.



Calculation for balance of Environmental flows, other losses and other inflows (Balance Factor BF).

			LC	SF	UC	BF
Year	Melb. Water reported storages level at start of year	Melb. Water reported storages level at end of year	Change in storages level for year	Melb. Water Streamflow to 4 major harvesting reservoirs (Inflows)	Melb. Water Total Urban Consumption (Inc. Western Water)	Balance of Environmental releases, irrigation, evaporation and other inflows
						BF=LC-SF+UC
	ML	ML	ML	ML	ML	ML
1998	1,290,500	1,230,000	-60,500	432,954	504,066	10,612
1999	1,230,000	1,030,000	-200,000	318,183	494,880	-23,303
2000	1,030,000	1,092,792	62,792	559,909	493,110	-4,007
2001	1,092,792	1,047,636	-45,156	426,285	491,944	20,503
2002	1,047,636	905,000	-142,636	324,202	482,972	16,134
2003	905,000	1,002,913	97,913	508,839	453,091	42,165
2004	1,002,913	1,073,000	70,087	508,004	441,358	3,441
2005	1,073,000	1,036,000	-37,000	392,172	443,722	14,550
2006	1,036,000	691,000	-345,000	163,337	449,044	-59,293
2007	691,000	693,500	2,500	371,966	379,009	9,543
			Average SF =	400,585		
					Average BF =	3,035

Single year example - 2003 storage level change



An average additional 3,035 ML is available from the total balance of environmental flows, other losses and other inflows, to suppliment the 4 main storage inflows of 400,585 ML to giving an average inflow to storages of 403,620 ML. (available to offset against consumption)

The 10 year average for the 4 main storage inflows of 400585ML will be supplemented by 3035ML giving a base average inflow of 403620ML to compare against total urban consumption. Thus allowing accurate storage level assessment.

Appendix B

Calculation of annual 'further severe climate change' reduction to annual inflows

Joint CSIRO/Melbourne Water predictions are for a most severe reduction in reservoir inflows of 11% on the 'long-term' inflows by 2020 Assuming 'long-term' to be from the middle of the last 10 years (conservative as this is already substantially reduced from the longer term), then the 11% reduction would occur over the 17 years (mid last 10 years = 2003 to 2020), giving an 0.65% annual reduction to inflows.

Average total inflows are derived from total water supplied and the storage level changes below:

			LC	WS	TI
Year	Melb. Water reported storages level at start of year	Melb. Water reported storage level at end of year	Change in storages level for year from graphs	Total water supplied (as reported by WSAA)	Total inflow to storages
					TI=WS+LC
	ML	ML	ML	ML	ML
2000/01	895,000	905,500	10,500	631,628	642,128
2001/02	905,500	893,000	-12,500	633,620	621,120
2002/03	893,000	717,000	-176,000	555,308	379,308
2003/04	717,000	865,000	148,000	531,243	679,243
2004/05	865,000	938,000	73,000	559,762	632,762
2005/06	938,000	850,400	-87,600	526,350	438,750
	^ from MW graphs ^				
			Average Storage Inflow =		565,552

Hence the annual 'further severe climate change' reduction to inflows is taken as 0.65% of 565552ML = 3.676 GL.

From 2007 to 2016 this will be 0.65 x 9 years = 5.9%, or 9 x 3.676 = 33 Gigalitres.