

## ***Interactive comment on “Virtual industrial water usage and wastewater generation in the Middle East/North African region” by S. R. Sakhel et al.***

**Anonymous Referee #1**

Received and published: 19 March 2013

This paper aims at quantifying volumes of water usage, wastewater generation, virtual water export, and wastewater generation for export for 8 industries in the so called MENA region.

There is a lot of research being conducted currently on the topics of virtual water and water footprint. These concept are definitely relevant for the journal HESS.

Much research has been done on the virtual water content/water footprint of agricultural products. Detailed research on industrial water use for these concepts (industrial water footprint/virtual water from industrial processes) has been scarce up to date. Approaches to assess volumes were often very basic. In that sense this paper could make a valuable contribution to the literature. To have scientifically based virtual water quantifications associated with the presented industries would indeed be very valuable.

C399

However, the paper as presented has many flaws in its current form:

1. The presentation of the paper is very poor. The English is ok, but the content within the current structure makes the paper very hard too read and understand. On the one hand there is a lot of information about certain rather irrelevant aspects, on the other hand there is a lack of information on key aspects. To give some examples:

1.1 A lot of information is given randomly from page 1001 line 2 to page 1002 line 3. Random information like that could be presented in a figure or table based upon solid data from a trusted source (like the FAO, UN). In its current form it just confuses the reader and contributes to the paper not being concise and well structured. This section could be deleted.

1.2 Another example of irrelevant information is an almost 2 pages section on why these 8 industries are relevant for choosing: page 1003 line 8 to page 1004 line 28

1.3 There is a lack of information on the status of virtual water (and related water footprint) research. There is almost no consideration of related work, including appropriate references. There is no relation given to terms like blue, green or blue water. It appears that the authors missed the last decade on research on these topics. They refer to Chapagain and Hoekstra (2004) (page 1002, Lines 18-19) as a recent work. This work relates to the quantification of virtual water flows for the period 1997-2001. However, more recent work from the same authors quantifies the water footprint and virtual water flows off all nations for the period 1996-2005. The statement of the authors on page 1002 lines 26-27 is not correct.

2. Probably the most important remark is that the methodology of the paper is not clear. There is little information given on the used data sources and the exact methodologies used. A table with a detailed overview on data sources used, should be presented. The methodologies are presented in Table 2, but are not clear and almost fully based on grey literature. There are almost no journal publications referred to. Even wikipedia is very often referred to, e.g. Table 1 although there are definitely more solid data

C400

sources for this table (e.g. UN). There are many examples where the methodology is exclusively based on grey dubious literature, e.g.:

2.1 Table 2, Refineries: It is quoted that (Sandy, 2005) is used to quantify the water requirement for 1 crude oil barrel. If I click this link in the reference list, the pdf seems to have disappeared. Backer and Wurtz (2003) seems to have no digital link.

2.2. Table 2: Olive oil - IPPC, 2005 should give the specific water requirement value per ton olive oil. If I click the link of this reference, I find no indication whatsoever about the water requirement for olive oil in this document.

2.3 Table 2: for Fertilizers a long list of specifications and different fertilizers is given. Where do the authors have all these data for MENA countries from. Did they use all these fertilizers in their analysis? This is extremely vague.

2.4. The reference list is an enormous list of grey literature, with e.g. the same reference of Egyptian Environmental Affairs Agency listed 4 times, Wikipedia listed 5 times etc.

3. Due to the above listed flaws, the results presented in the paper are scientifically not justified. If the authors would rewrite their paper, presenting the methodology and used data in a structured and concise way and discarding all other useless information, then the results could be justifiable. They should use tables, figures with flow charts, reliable data sources and references. In its current form the paper is not acceptable.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 999, 2013.