



Vienna, Austria

April 21, 2016, 15:30 - 17:00

## Draft Agenda

- 1 Welcome, Agenda, Purpose of Meeting
- 2 Working Group Charter: Overview, Discussion
- 3 Relevant ConnectinGEO activities: observation inventory, gap analysis
- 4 Outline of Demonstration Project
- 5 Manuscript on Earth Observations and the FWEN
- 6 Other projects/Opportunities
- 7 Summary of Action Items

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Working Group Web Page: <http://www.tiwah.com/ENEON/FWEN>



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[FWEN WG](#)

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## ENEON Food-Water-Energy Nexus Working Group

[Introduction](#)  
[WG Membership](#)  
[WG Meetings](#)  
[WG Charter](#)  
[Sign Up](#)  
[Workspace](#)

### News:

Splinter meeting of the FWEN WG at EGU.  
[Read more ...](#)

### Introduction

The FWEN Working Group of ENEON is working with European EO communities and networks to improve decision support in the broad domain of the food-water-energy nexus. A goal is to demonstrate that cross-domain and discipline cooperation between EO networks and communities analysing EOs can provide new information and improve the understanding of an issues as complex as the FWEN. The working group is supported by Task 5.6 of the ConnectinGEO Project.

At the first [ENEON Workshop](#), several themes were considered for such a demonstration project. There were three theme proposals:

- Urban coasts under climate change and sea level rise
- Resilient communities
- Food-water-energy nexus.

The participants selected the FWEN as the theme for this interdisciplinary demonstration project.

Under this theme, the task will apply the ConnectinGEO methodology to indicators related to this FWEN and explore to what extent ENEON provides an environment that supports a transdisciplinary nexus approach to a complex and societally highly relevant issue. Specifically, the task will conduct the following activities:

- Use the observation inventory and the gap analysis to identify potential stakeholders who can benefit from collaboration across disciplines and domains represented in ENEON and develop a compelling argument for the prioritization of FWEN-related observations and products based on results from the work packages.
- Determine stakeholders, develop plans for further research and investigate regional, national and international funding opportunities to cover the gaps identified.
- Analyze the cost saving potential of collaborations across previously segregated disciplines and domains



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### Vision

Providing the environmental intelligence required to address the Food-Water-Energy nexus in a holistic governance framework on European scale.



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Providing the environmental intelligence required to address the Food-Water-Energy nexus in a holistic governance framework on European scale.

### Mission

The mission of the FWEN Working Group of ENEON is to demonstrate that cross-domain and cross-discipline cooperation between Earth observation networks and communities analysing EO data can provide new information and improve the understanding of the complex Food-Water-Energy-Nexus (FWEN), and to improve decision support in the broad domain of the FWEN.

## 2 Working Group Charter: Overview, Discussion

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### Tasks

- Use the observation inventory compiled in ConnectinGEO and the gap analysis methodology proposed by ConnectinGEO to identify potential stakeholders who can benefit from collaboration across disciplines and domains represented in ENEON and develop a compelling argument for the prioritization of FWEN-related observations and products.
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### Questions

- How can collaboration and coordination through ENEON help to inform about the FWEN and impacts in Europe?
- Which SDGs relate to the FWEN and which are the relevant indicators?
- What are the EVs needed to quantify these indicators and can ENEON help to quantify the indicators for these SDGs?
- What ENEON products could support policy making that takes a nexus perspective?

## 2 Working Group Charter: Overview, Discussion

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### Outcomes

The outcomes expected from the WG include a **report characterizing the gaps** that hamper the use of GEOSS in addressing complex issues and proposing actions to address these gaps. The report will **identify the stakeholders** of the FWEN who would be impacted by the identified gaps and who would benefit from actions addressing the gaps. The aim is to **quantify the societal benefits** and to estimate the benefit-to-cost ration. A particular focus will be on the potential contributions of ENEON in closing the gaps. The report will also describe the **EVs relevant for the FWEN** and assess to what spatial and temporal extent data for these EVs is available through ENEON.

An attempt will be made to **identify at least one product** that directly relates to the FWEN and that could be produced based on data provided by ENEON members. Prime candidates are quantification of SDG-related indicators that are relevant to the FWEN. The EVs related datasets will be identified and an inventory of these datasets will be compiled.

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## 3 Relevant ConnectinGEO activities: observation inventory, gap analysis

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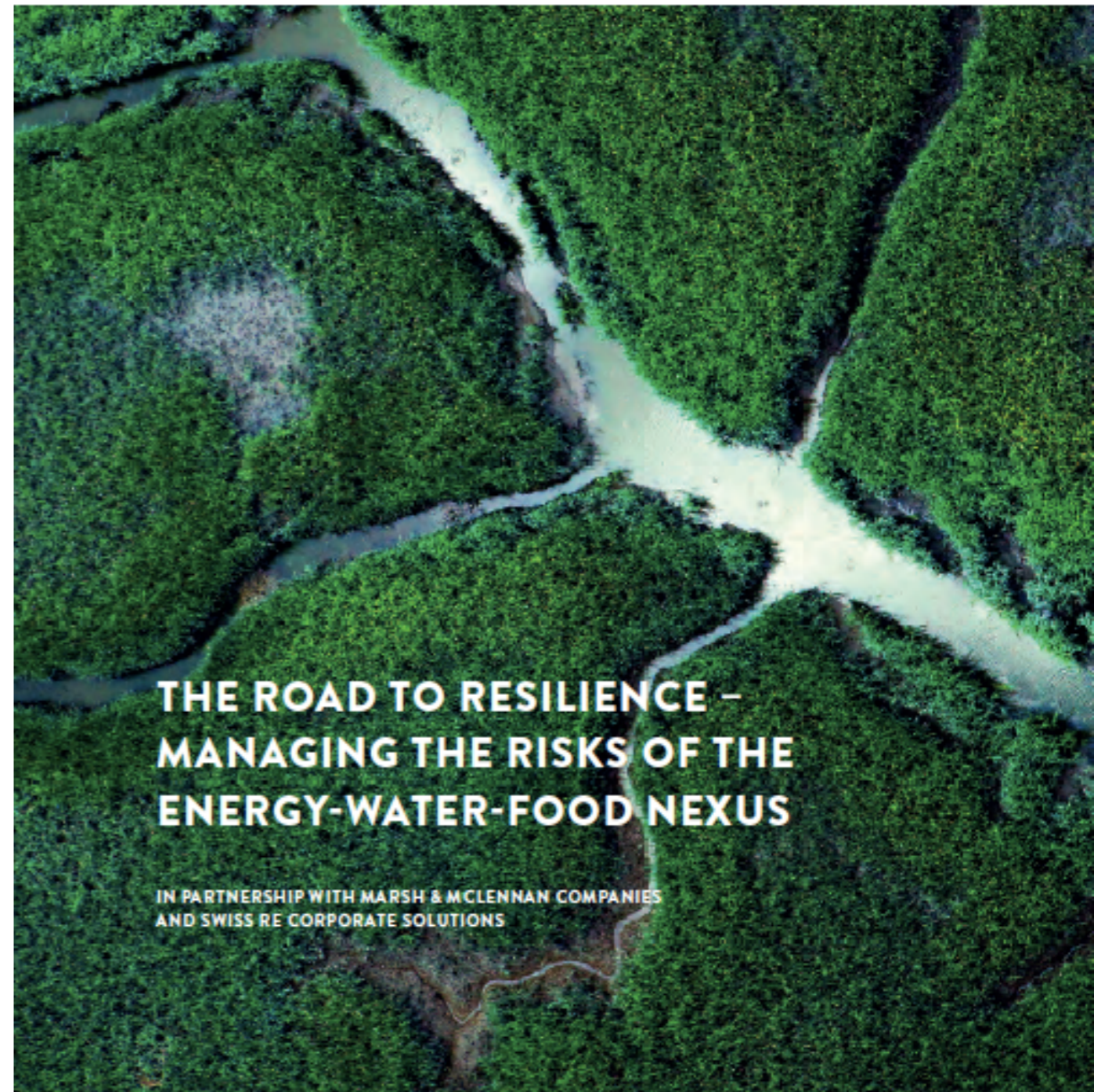




## 4 Outline of Demonstration Project

## World Energy Perspectives | 2016

### 4 Outline of Demonstration Project



## 4 Outline of Demonstration Project

## 4 Outline of Demonstration Project

### KEY FINDINGS

1 ENERGY IS THE SECOND LARGEST FRESHWATER USER after agriculture. Water is used all along the energy value chain in primary energy production (coal, oil, gas, biofuels) and in power generation (hydro, cooling). 98% of the power currently produced needs water.

2 THE RISKS POSED BY THE ENERGY-WATER-FOOD NEXUS WILL BECOME MORE SIGNIFICANT because of growing demand for energy, water and food. Moreover, some of the regions that are currently water stressed are also likely to see significant economic development, population growth and changing consumption patterns, and a higher concentration of people and assets in critical areas, intensifying the risks posed by the nexus.

3 ALONGSIDE GROWING DEMAND, INCREASING UNCERTAINTY ABOUT WATER AVAILABILITY and quality - driven by climate change impacts such as declining freshwater availability, increased ocean temperatures and more extreme weather - will further increase the significance of risks posed by the nexus.<sup>1</sup>

4 ANALYSIS IN NATURE CLIMATE CHANGE<sup>2</sup> highlights that from 2014 to 2069, reductions in usable water capacity could impact two-thirds of the 24,515 hydropower plants analysed and more than 80% of the 1,427 thermal electric power plants assessed.

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### KEY FINDINGS

5 IN MANY CASES, THERE IS A LACK OF LOCATION-SPECIFIC KNOWLEDGE ON WATER ISSUES and a lack of modelling tools to adequately reflect risks posed by the nexus in energy infrastructure investment decisions. Such risks can be associated with large economic stakes: in 2015, hydropower facilities in Brazil sustained economic losses of more than US\$4.3 billion due to drought-related energy and water rationing measures.

6 THE RISKS POSED BY THE NEXUS ARE OFTEN EXACERBATED by the lack of sound water governance such as well-defined water rights for competing users, water pricing and trading arrangements.

7 CROSS-BORDER COOPERATION IS A KEY ISSUE. 261 international trans-boundary basins cover 45% of the earth's land surface, serve 40% of the world's population and provide 60% of the earth's entire freshwater volume. This affects the operation of planned and proposed energy infrastructures, and there is a need to ensure that adequate cross-border water management frameworks are in place.

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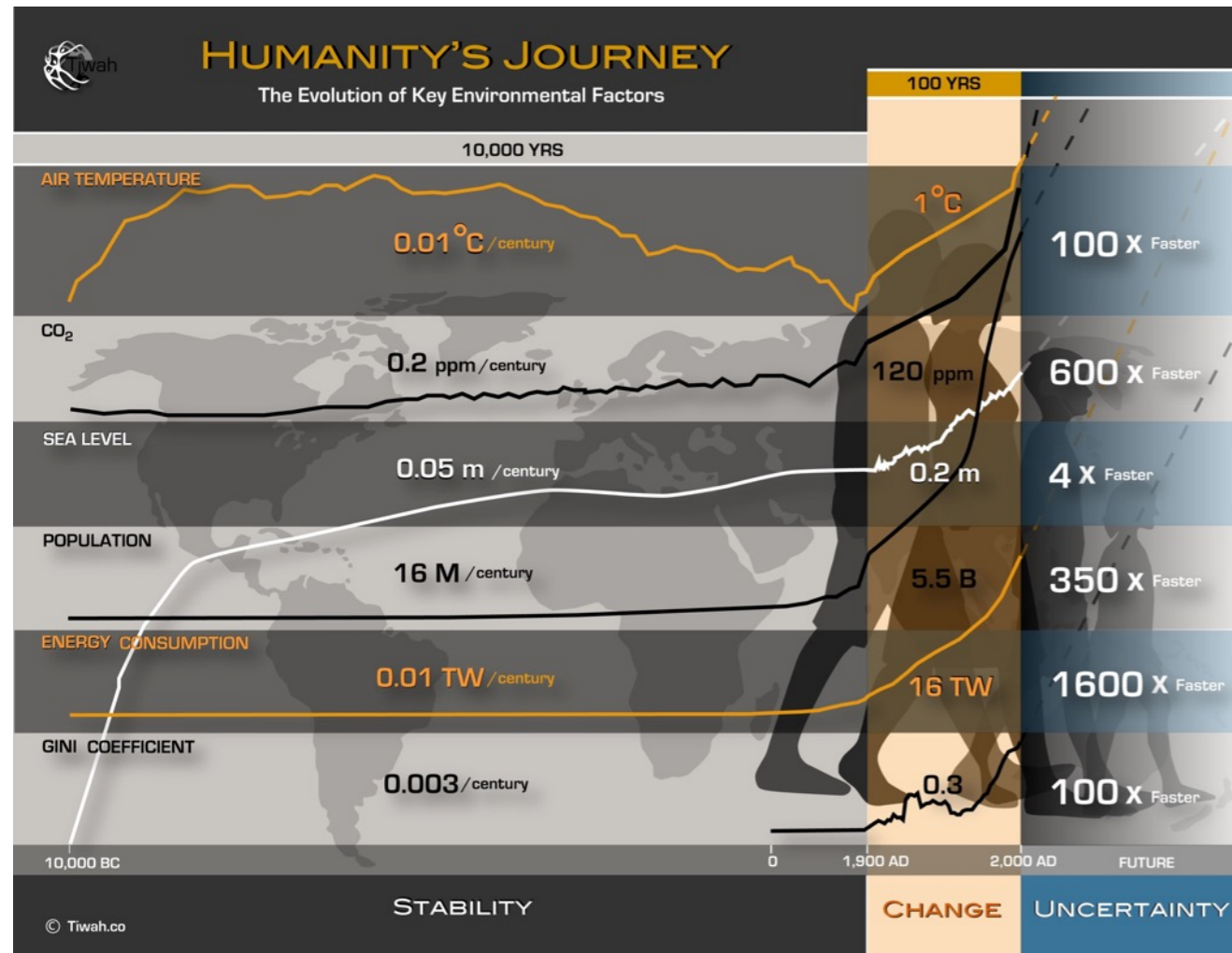
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Proposal: Address these issues for Europe by identifying relevant EO-based products



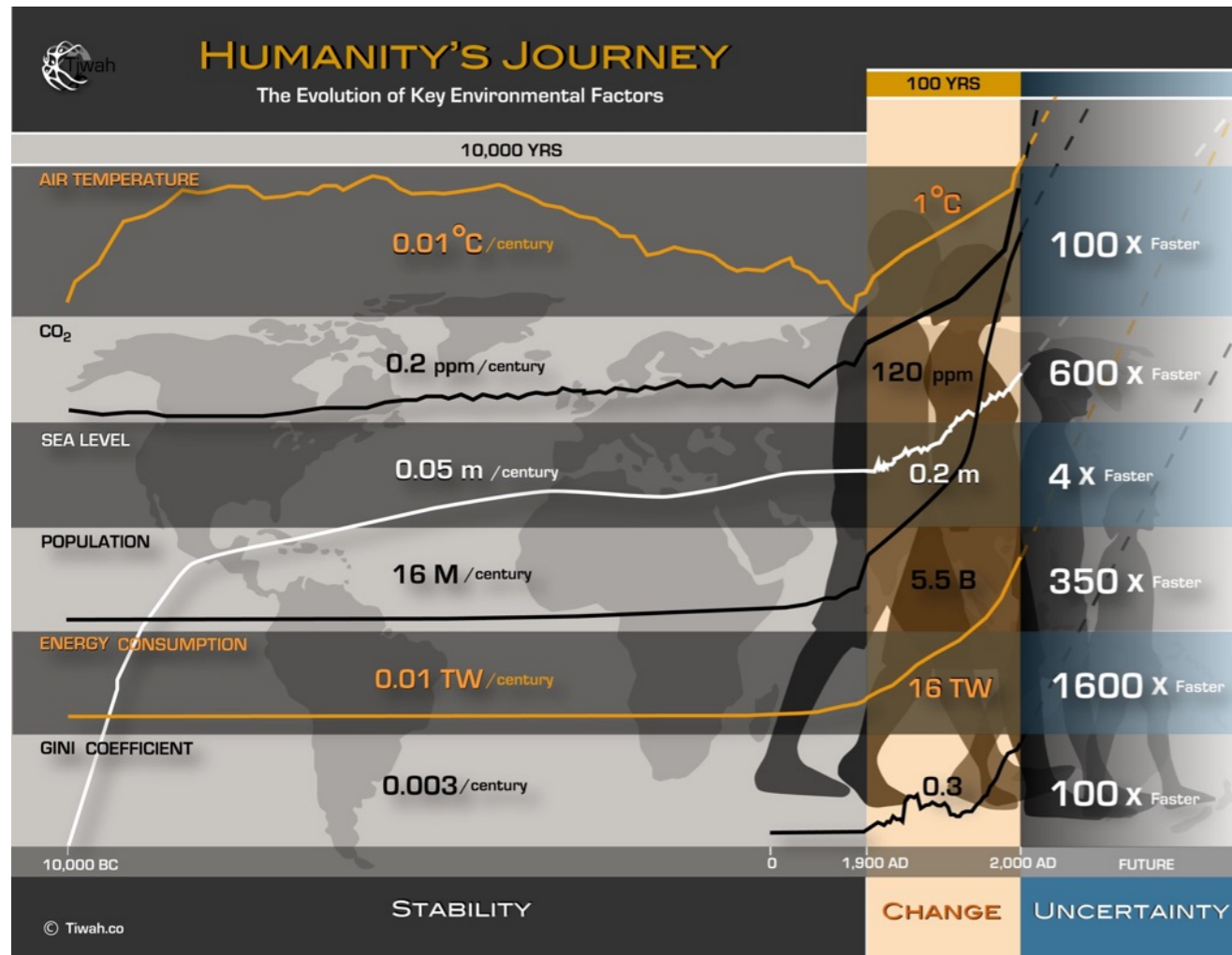
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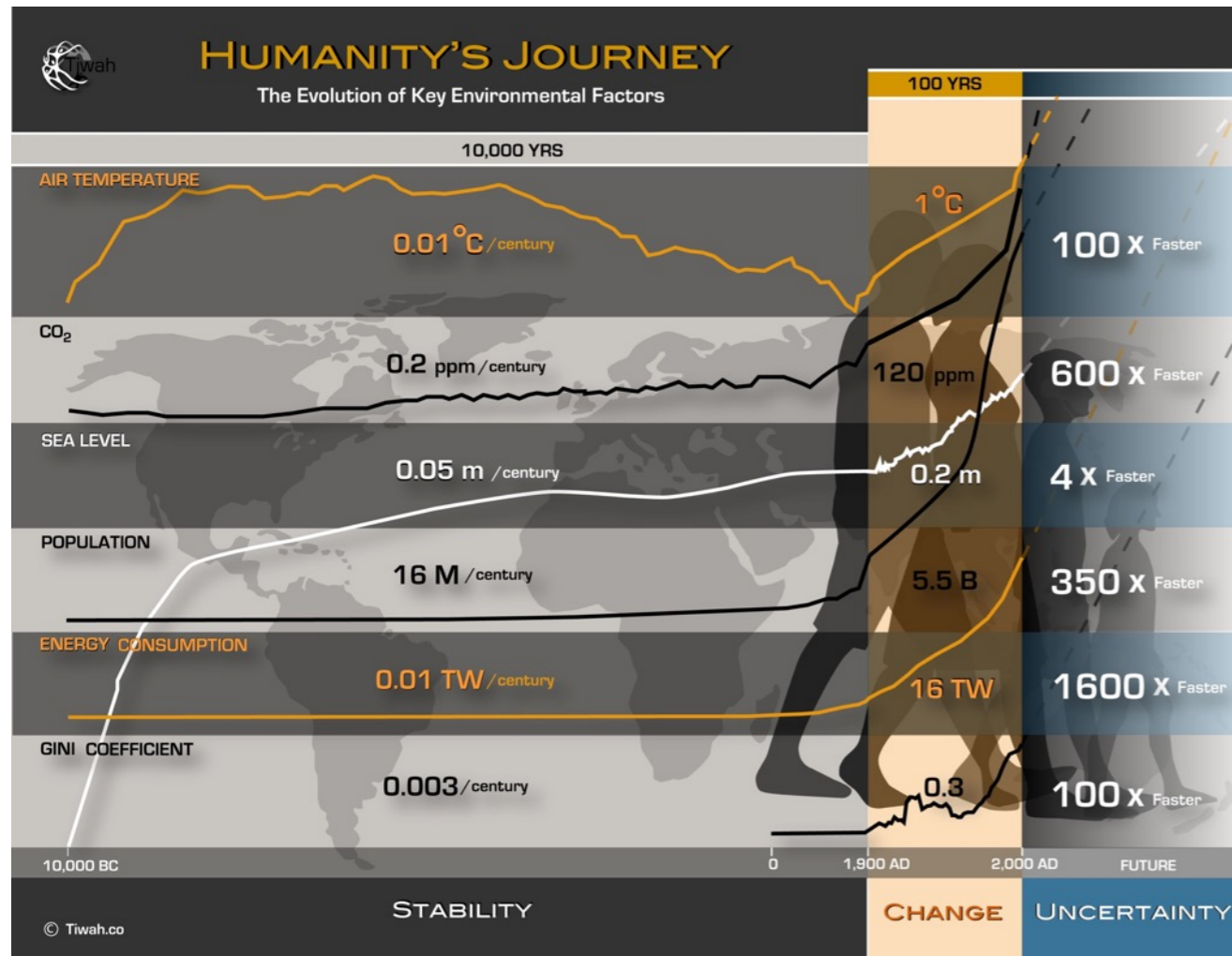
## 4 Outline of Demonstration Project

Energy usage increased in the last 100 years 1,600 times faster than on average throughout the Holocene

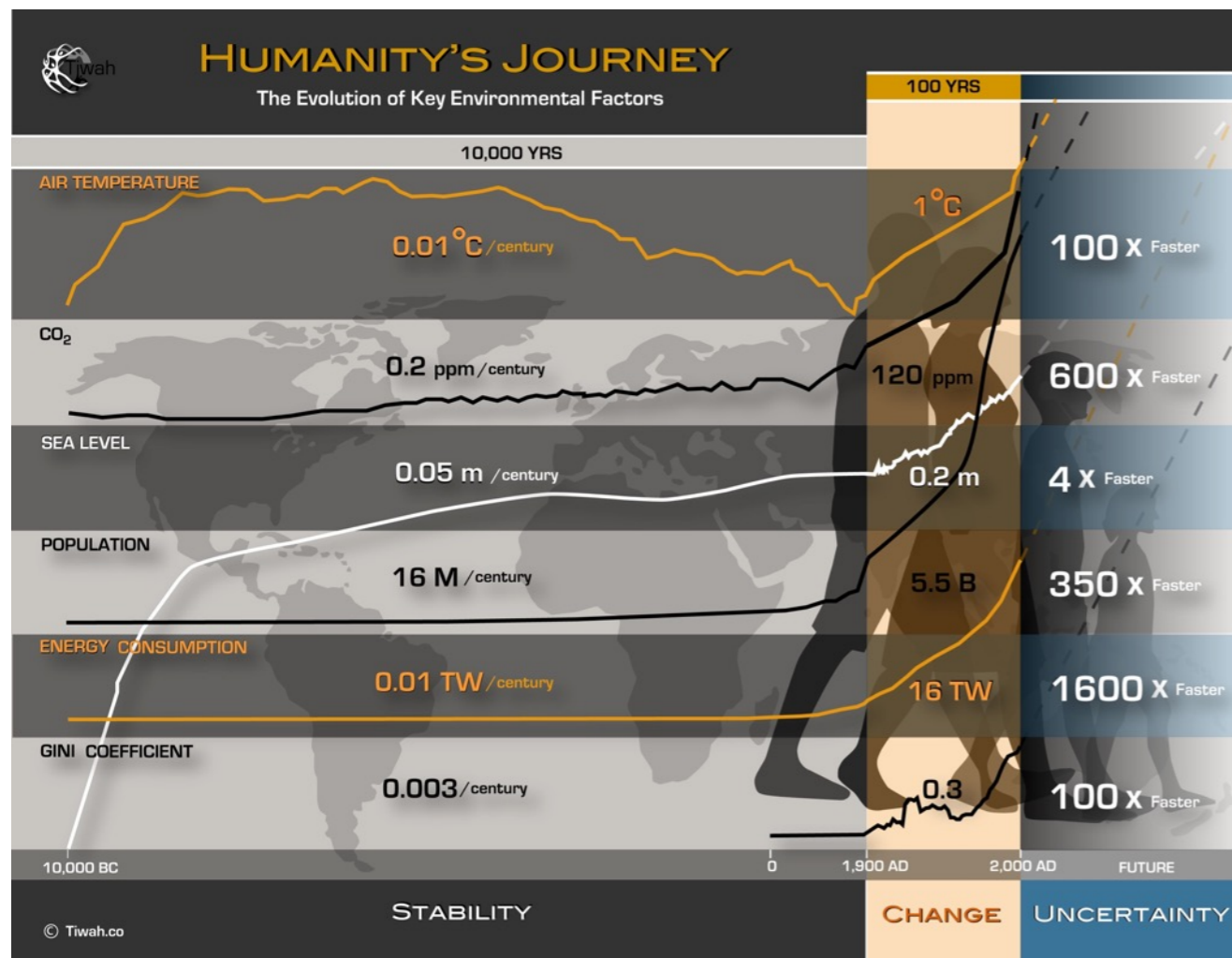


## 4 Outline of Demonstration Project

Energy usage increased in the last 100 years 1,600 times faster than on average throughout the Holocene  
It sustained a population growth 350 times faster than in the Holocene before



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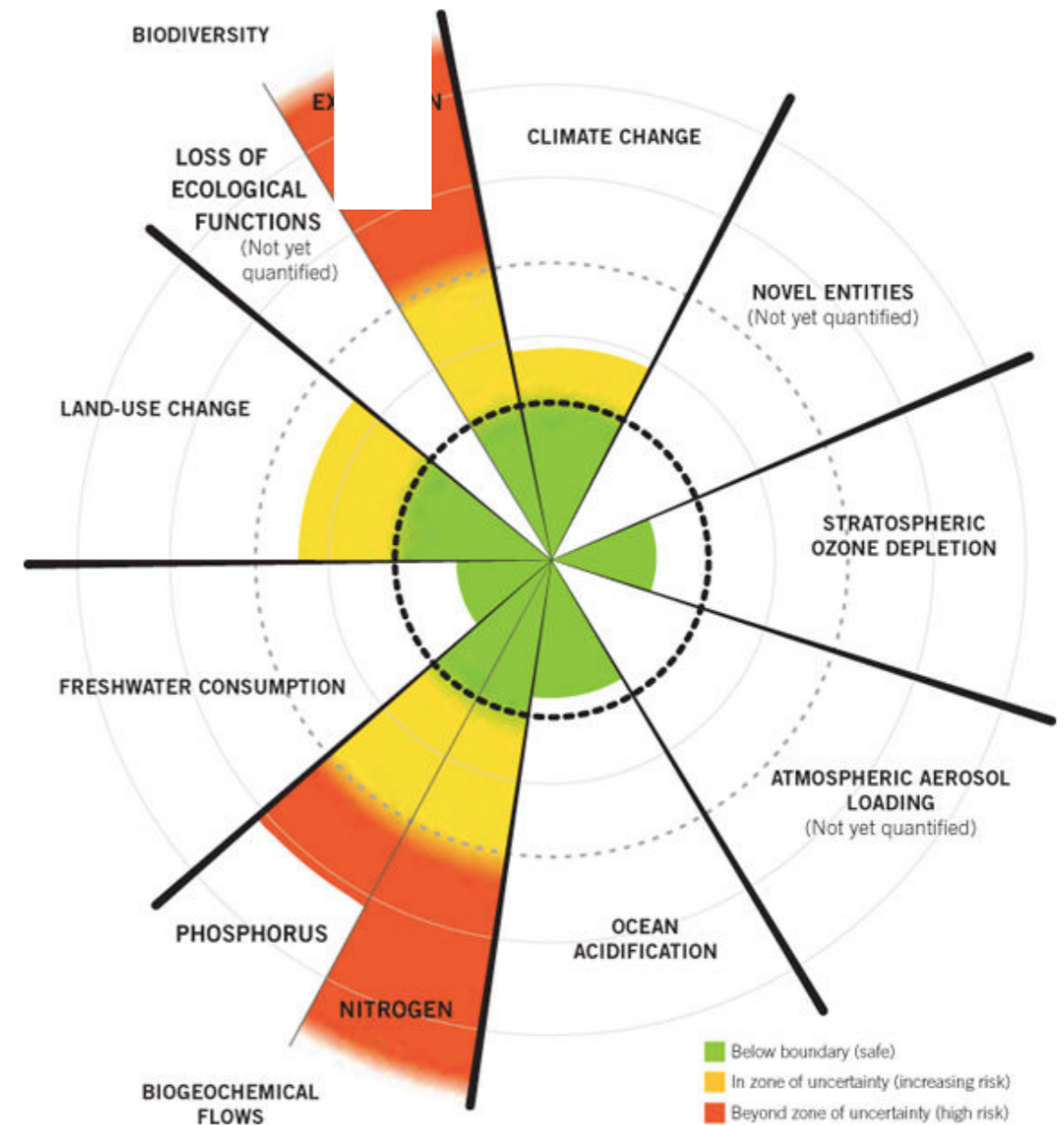
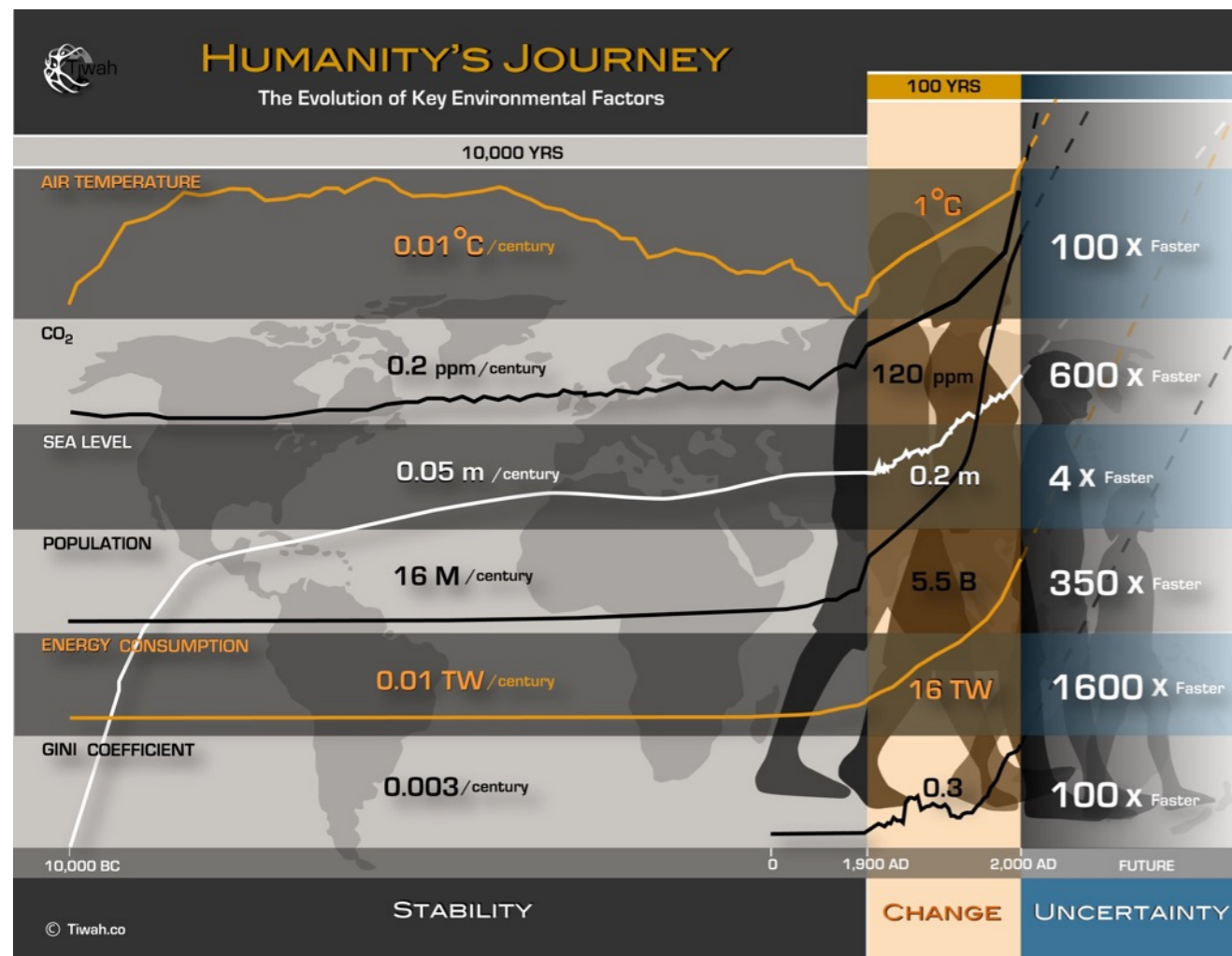


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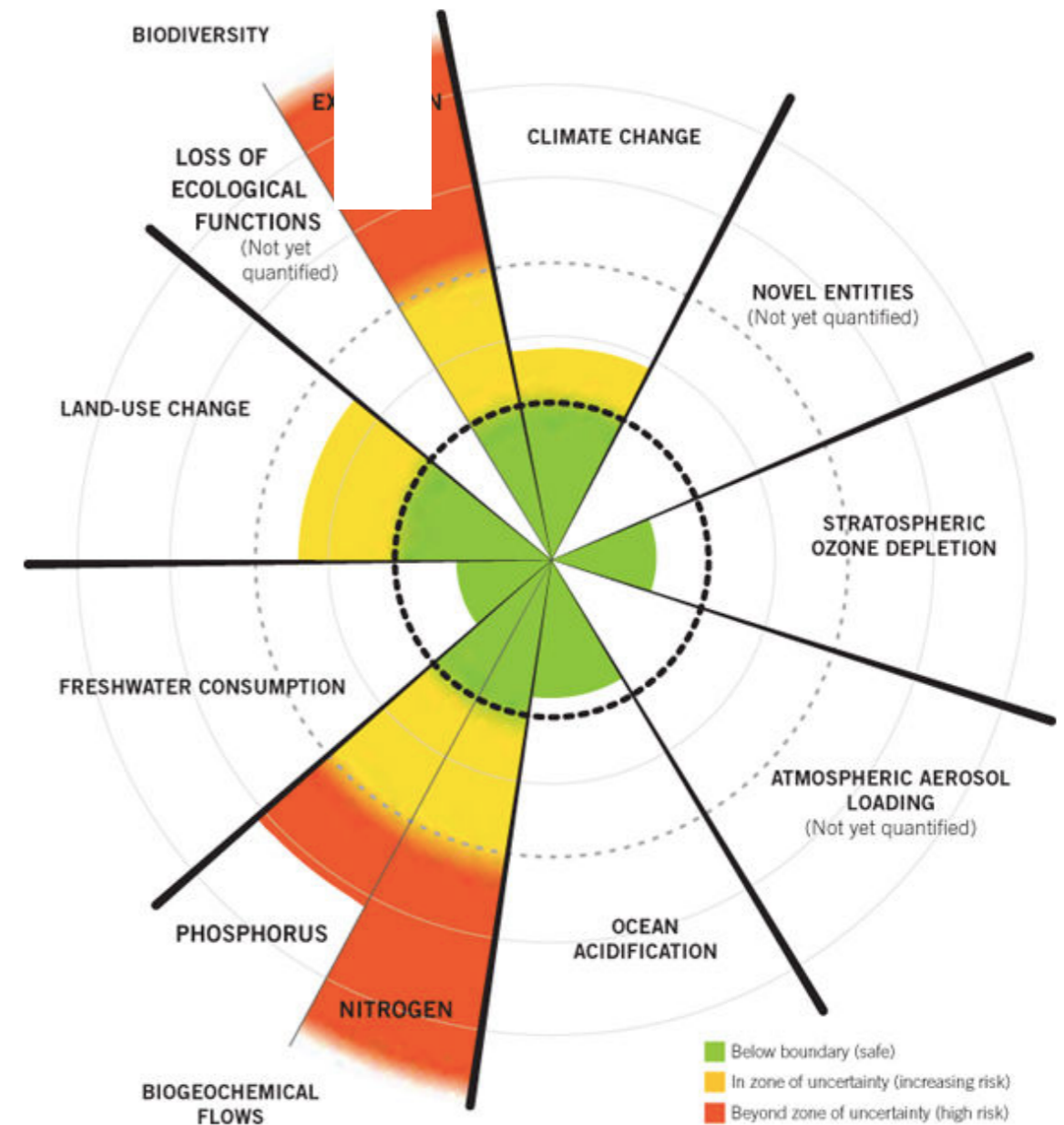
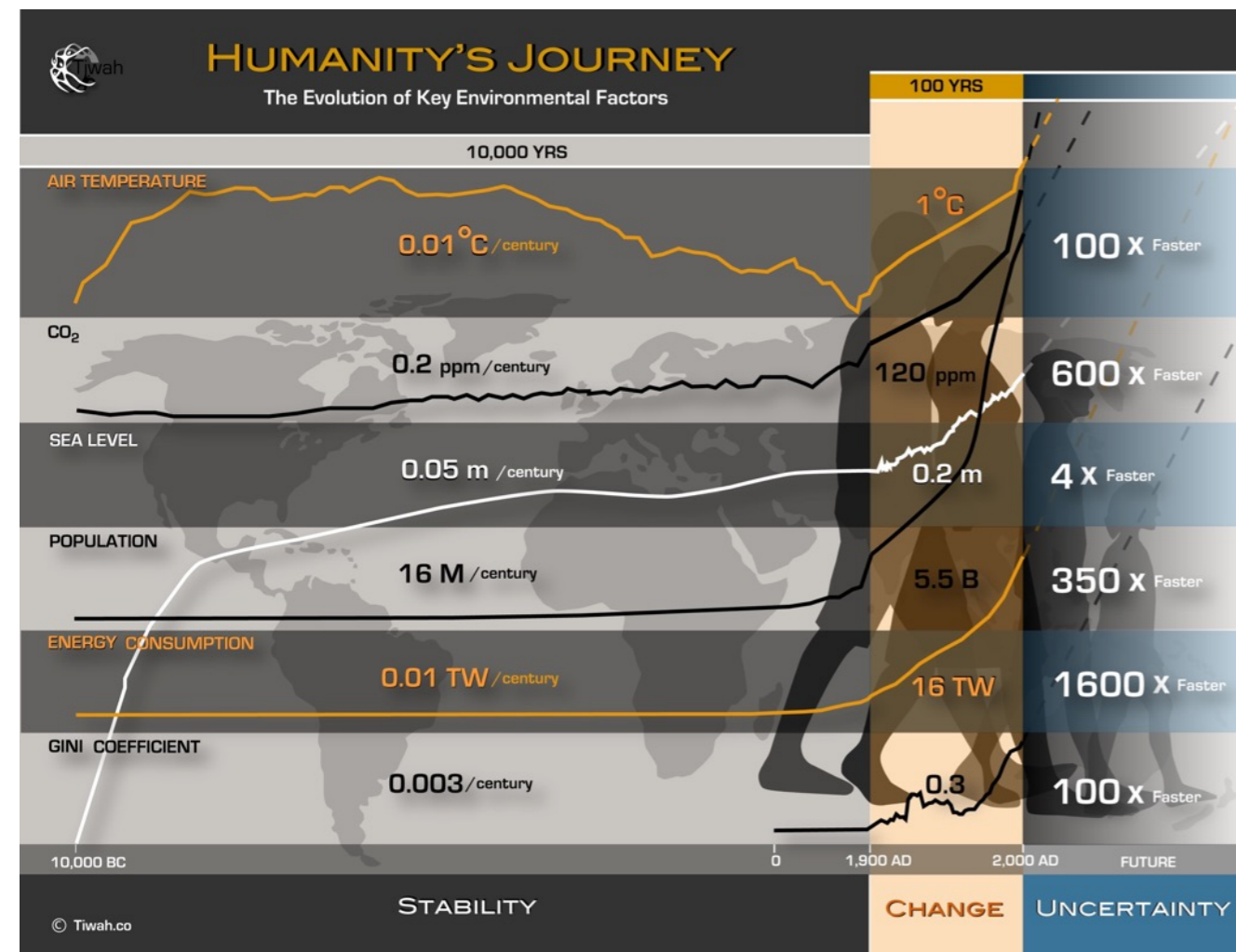
Being based on fossil fuels, it pushed us out of the “safe operating space for humanity”

## 4 Outline of Demonstration Project



Rockstrom and Klum, 2015

## 4 Outline of Demonstration Project



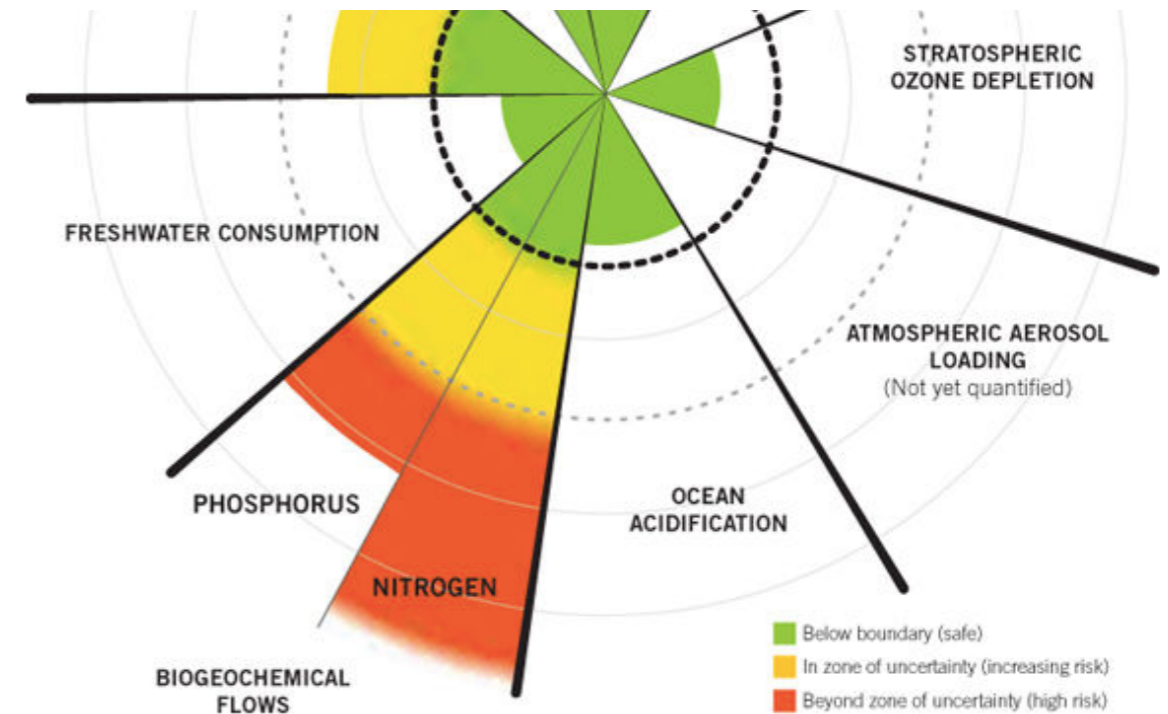
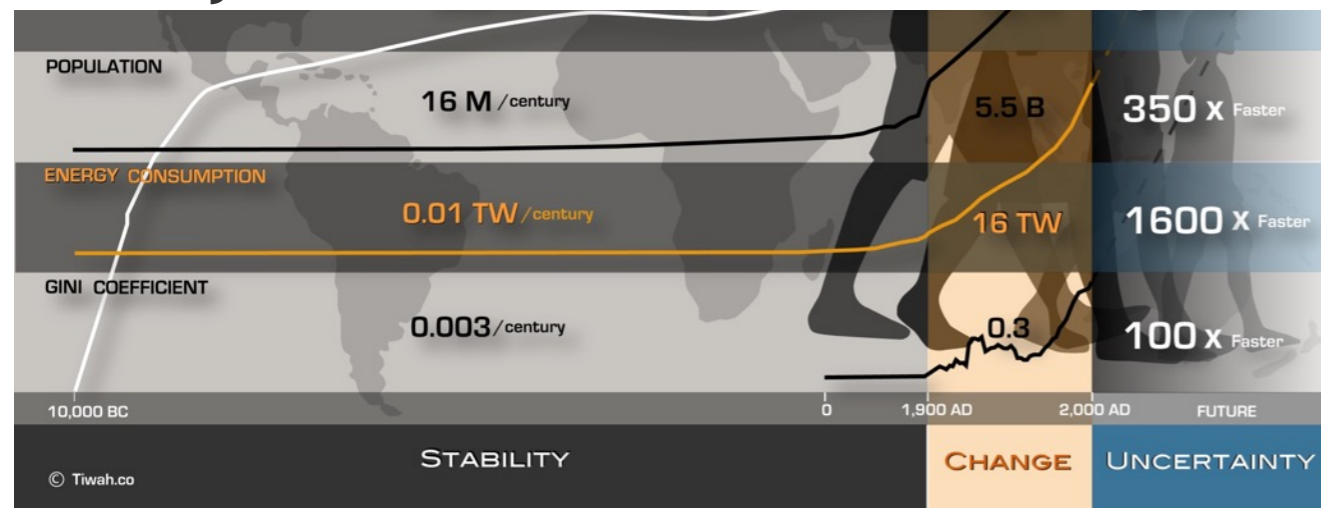
# Energy-Population-Food-Water Nexus

## 4 Outline of Demonstration Project

Warren, S. G., 2015. Can human populations be stabilized? Earth's Future: DOI: 10.1002/2014EF000275

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Producing more than two offspring is normal for all animal species with stable populations because their populations are limited by resources or predation rather than birth control. It may therefore be appropriate to view the growth of human population as the result not of excess fertility but rather of excess food.



# Energy-Population-Food-Water Nexus





## 5 Manuscript(s) on Earth Observations and the FWEN

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*Nexus perspective: understanding the interdependencies between energy usage and availability, population growth, global change, food security, water security, and the global boundaries*

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**Questions:**

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*What ENEON products could support policy making that takes a nexus perspective?*



## 5 Manuscript(s) on Earth Observations and the FWEN

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### *Options:*

- *report (good for ConnectinGEO)*
- *High level paper SDG-FWEN*
- *review paper (Earth's Future)*
- *special issue (Physics and Chemistry of the Earth; more contributors, diversity, guest editors)*





## 6 Other Projects/Opportunities



## 7 Summary of Action Items

A1: Hans-Peter Plag will ask all to read reports/upload reports -

A2: Joan Maso: identify relationship of FWEN to SDGs

A3: Hans-Peter Plag: identify issues/problems that could benefit from EOs

A4: Ian McCallum: identify the FWEN stakeholders

A5: WG to design a product (something we could not do without ENEON)

A6: All to approach providers to become part of the project to produce the product

A7: WG to implement the product