

# Environmental Engineering

*Invited talk presented at ICER 2016, Lübeck*

<panel type=„default“ title=„The Role of Environmental Engineers in Reaching Sustainable Development Goals – The Way Forward“ subtitle=„“ icon=„fa fa-house“> The international community represented by the United Nations has defined 17 sustainable development goals to transform our world. Development goals range from societal challenges such as poverty reduction, nutrition and health to cross-cutting and integrating targets like climate action. Sustainable provision of clean water and sanitation on the one hand and the production of affordable clean energy can be considered pivotal actions. Water and energy are generic resources needed for the production of food and economic development. </panel>

<jumbotron> Environmental engineers play a key role in achieving sustainable development goals: Innovative and new engineering designs in the water and energy sectors are needed to increase water use efficiency, reduce pollution and provide renewable and clean energy with minimal collateral impact on other resources. </jumbotron>

In order to achieve these goals, it is suggested that environmental engineers align and focus their activities and interdisciplinary cooperation according to five key principles.

- Engineering needs to integrate the environment into the design process, operation and life-cycle assessment. Instead of designing stand-alone storages, natural storages such as aquifers need to be integrated. Instead of an isolated engineering design, engineering needs to become a supporting element of environmental systems.
- Engineering designs need to integrate users and societal impacts. The human user needs interfaces and interaction with environmental designs, the impact and benefit of engineering need to be part of the design.
- Environmental engineering needs to be entropy minimal, thermodynamically economic and resource-efficient. In times of energy awareness, designs cannot be evaluated regardless of their footprints on environmental systems they are embedded in.
- Environmental engineering solutions need to be connected and responsive. A new era of swarm designs, integrated and inter-connected systems is to begin with the internet of things and production 4.0.
- And finally environmental engineering designs need to be scalable, reproducible and evolutionary. Living in an open knowledge society, cooperative design, open source principles and evolutionary development by generations of communities designing products will have a stronger role. Education and research matter for this last aspect and make environmental research and engineering sustainable and lasting.

Working along these five lines, the community of environmental engineers can play a key role in reaching the sustainable development goals.

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