Topic Area 5: Data Analysis to Inform Planning, Policy, and other Decisions
主题 5: 规划、政策及相关决策的数据分析

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Topic 5 Challenges 挑战

Challenges挑战:

- Increasing demand for energy and water
- 增长的能源和水资源需求
- Poorly-understood connections between energy and water
- 欠缺对能源和水资源关系的理解
- Narrow, rather than integrated, planning between sectors
- 各领域间狭隘而非整合性的规划
- Complex and compounding uncertainties related to:
- 繁复混杂的不确定性
  - Population growth人口增长
  - Urbanization城市化
  - Energy costs燃料成本
  - Precipitation patterns降水形态
  - Climate change气候变化

Topic 5 Alternatives and Goals
变更和目标

Management Alternatives管理变更:

- •Expand non-traditional water supplies (e.g., desalination, reuse)发展非传统水供给(如淡化水, 回用水)
- •Use water efficiently in energy and vice versa能源供给过程中节约用水，反之亦然
- •Develop effective policy and decision-support tools for integrated planning开发有效的政策和决策支持工具以整合规划

Goals目标:

- Reliably meet water and energy demands保证满足能源和水资源需求
- Control costs控制成本
- Limit greenhouse gas and other environmental consequences控制温室气体和其它环境后果

Topic Area 5: Objectives
任务

Objectives

- Identify effective water and energy technologies that minimize costs and maximize water/energy efficiency and GHG reduction.
- Highlight climate impacts on future energy development paths and water limits in key regions of China and the American West.
- Engage stakeholders in a participatory decision support framework that builds consensus amongst key actors
- Conduct policy analysis to provide insights and recommendations for future energy-water nexus management decisions and optimal co-control of energy and water

任务

- 明确有效的水和能源技术以最小化成本并最大化水/能源效率，同时减少温室气体排放
- 关注气候对中国主要地区及美国西部未来的能源开发途径和水资源限制的影响
- 将利益相关者加入决策支持框架以在主要成员中达成共识
- 实施政策分析以对未来的能源-水资源关系管理决策和最优的能源和水资源联合控制提供深入的认识和建议。

议题5：能源与水协同管理决策支持
Topic 5: Decision-making Support for Synergistic Management of Water and Energy

研究内容（Research Contents）

5.1 国家尺度水资源与能源系统模拟及其政策分析（中国水利水电科学研究院，王建华；国家发展和改革委员会能源研究所，杨玉峰）

5.1 Water-energy system simulation and policy analysis on national scale（IWHR, Wang Jianhua; ERI,NDRC, Yang Yufeng）

5.2 区域尺度水资源与能源耦合模拟及其决策支持

5.2 Water-energy coupling simulation and decision-making support on regional scale

5.2.1 西南地区储水量变化的水能影响及其政策响应（清华大学，洪阳）

5.2.1 Water-energy impact by water storage variation and the policy response in China's southwestern region（Tsinghua University ，Hong Yang）

5.2.2 西北地区水资源与能源协同发展调控方案（中国水利水电科学研究院， 赵勇；华北电力大学，王鹏）

5.2.2 Water-energy synergetic development and regulation plan for China's northwestern regions（IWHR, Zhao Yong; NCEPU , Wang Peng）

5.3 典型区水资源与能源系统管理及技术集成

5.3 Water-energy system management and technology integration in typical areas

5.3.1城市水能系统规划管理政策（北京大学，刘杰）

5.3.1 Urban water-energy system planning and management policies（Peking University, Liu Jie）

5.3.2风能太阳能水利应用研究与示范（国际应用能源技术创新研究院，严晋跃；中国水利水电科学研究院， 刘永忠）

5.3.2 Wind and solar energy application and demonstration in water conservancy sector（Insititute of International energy technology innovation research application, Yan Jinyue；IWHR, Liu Yongzhong）

Topic 5: Methods/Tools方法/工具

Life-cycle costing & environmental assessment

全生命周期成本和环境分析

and similar modeling tools

相似的模拟工具

Participatory Robust Decision Support

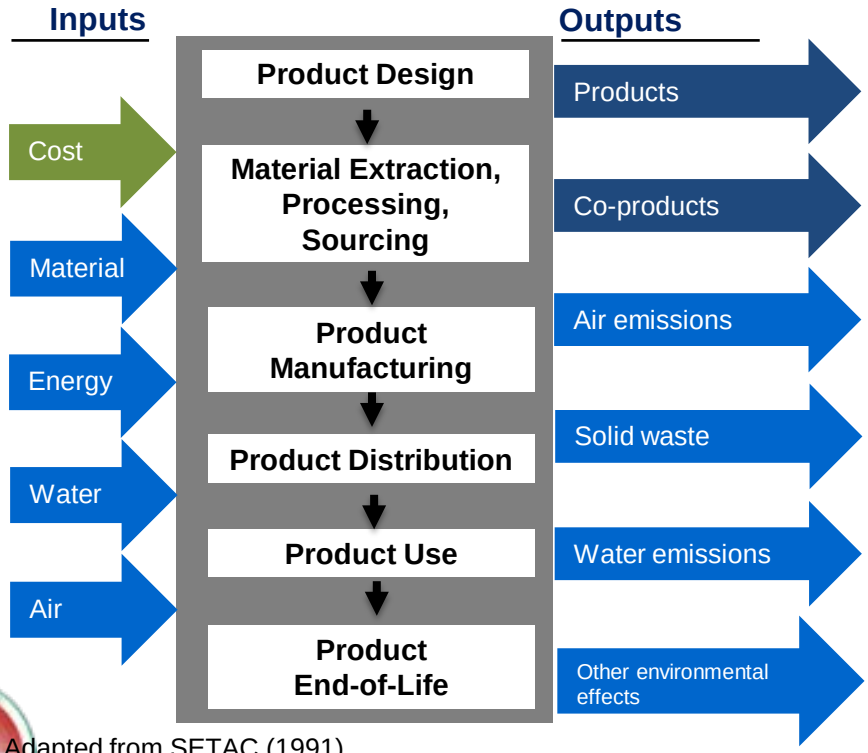
强大的参与式决策支持

5.1 Life-cycle systems analyses of water-energy processes and technologies
水资源和能源工序和技术的全生命周期系统分析

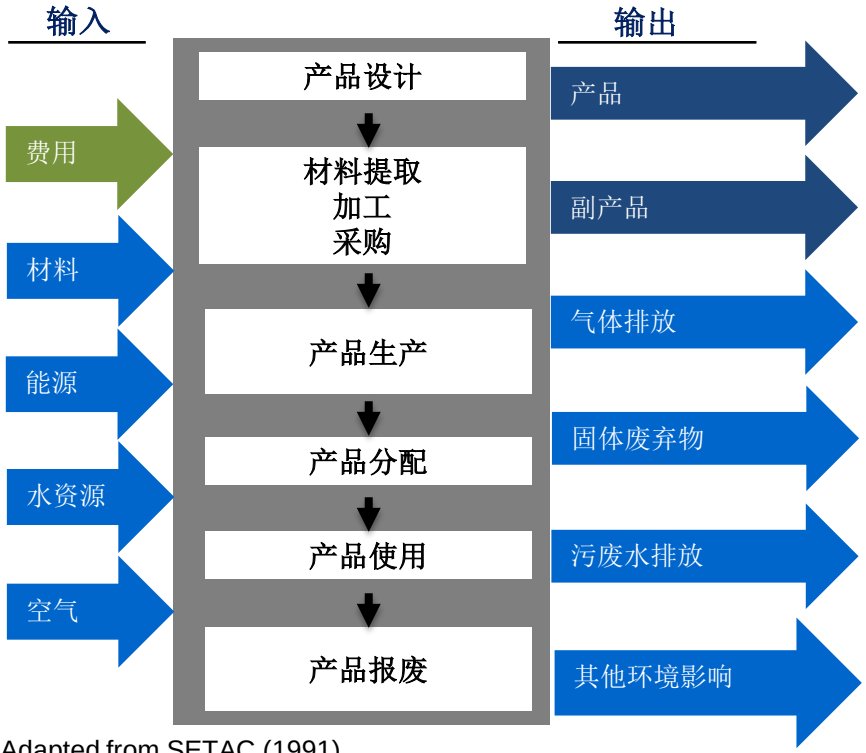
***1) Analyze diverse technologies and case study systems in the U.S. and China with life-cycle cost and environmental assessment** 使用全寿命周期成本和环境评估对美国和中国各种技术和研究系统进行分析*

Arpad Horvath and Jennifer Stokes, UC Berkeley

Seeking Partner in China
寻找中方合作伙伴



Adapted from SETAC (1991)



Adapted from SETAC (1991)

5.1 Life-cycle systems analyses of water-energy processes and technologies
水资源和能源工序和技术的全生命周期系统分析

2) Provide local, regional, and national policy recommendations for co-management of water/energy systems

Potential technologies

- Municipal/agricultural water, wastewater, and stormwater systems
- Conservation at utility and consumer scale
- Energy technologies from CERC-WET and similar (e.g., cooling, carbon capture, innovative generation)

2)为水/能源系统的联合管理提供当地、区域、国家等各层面的政策建议

潜在技术

- 市政/农业 水、污废水、雨水系统
- 公共事业和消费者范围的节约措施
- CERC-WET等能源技术(如冷却技术、碳捕获技术、创新性生产)

5.2 Integrated regional scale modeling of energy and water systems
能源和水资源系统的综合性区域范围模型

Nan Zhou, LBNL 周南 伯克利实验室

Problem问题

- Integrated approach required to evaluate the climate impacts of water-for-energy and energy-for-water linkages.
  需要综合性的解决方案来评估能源供应的用水足迹、水资源供应的用能足迹，以及气候变化对两者的影响

Objectives目标

- Develop robust design approach for analyzing climate, water and energy.
  为分析气候、水、能源而开发强力的设计解决方案
- Utilize approach to study climate, water and energy linkages in U.S. and China.
  运用解决方案对中美案例的气候、水、能源的联系进行研究
- Highlight climate impacts on future energy development paths and water limits in key regions of China and the American West
  关注气候对中国主要地区及美国西部未来的能源开发途径和水资源限制的影响

5.3 Participatory Robust Decision Support: Overview
参与式强力决策支持：概述

Annette Huber-Lee and Guoyi Han, Stockholm Environment Institute
LIU Jie, Peking University

Problem statement:

- Planning for water, food and energy systems inherently embodies deep uncertainty, including climate change. Major infrastructure investments and policies need to be resilient in the face of uncertainty, which can be addressed via robust decision techniques.

Research questions:

- What are the key external uncertainties?
- What are policy and infrastructure actions that could be taken to improve outcomes?
- What are the metrics of performance that should be used to evaluate what constitutes a good outcome?

Objective:

- Actions – infrastructure and/or policies – that are most robust in the face of the key uncertainties

问题说明:

- 水，食物，能源等方案的内在表现的深度不确定性，包括气候变化。重要基础设施投资和政策需要对不确定性保持，可通过强力的决策技术获得解决。

研究问题:

- 什么是重点的外部不确定性？
- 可以带来改善的政策和基础设施是什么？
- 可以用来对效果进行评估的性能衡量措施是什么？

目标:

- 行动（基础设施和/或政策）-面对重点不确定性应有的强力措施

5.4: Addressing Recycled Water and Energy Needs in an Increasingly Water-scarce Southern California systems 电力生产的循环水利用方案

Project Leads: JR DeShazo and Nicholas Chow, UCLA,

项目负责人： JR 德谢佐，加利福尼亚大学洛杉矶分校

Project 1: Forecasting recycled water

项目1：预测再生水

- Goal: To estimate the future energy needs of feasible recycled water production scenarios in Southern California.
- 目标:预测南加州在可行的再生水生产模型下的未来能源需求
- Motivation: Recycled water is an important part of the local water reliance portfolio.
- 动机:再生水是区域内水资源组合的重要组成部分
- Forecast recycled water production scenarios over the next few decades considering:
- 预测未来几十年再生水生产情景，考虑如下因素
  - Economic/Engineering optimization modeling 经济/工程优化模型
  - Changes in technology and policy 技术和政策的变化
  - Treatment of water to various standards 针对不同标准的水处理
  - Aggregate energy needs and different energy portfolios 能源需求对应的不同能源组合

5.4: Addressing Recycled Water and Energy Needs in an Increasingly Water-scarce Southern California systems 电力生产的循环水利用方案

Project 2: Grid services assessment
项目2： 水网服务评估

- Goal: To examine the potential for a flexible water grid which absorbs excess energy in times of over-supply to produce recycled water, and contributes energy in times of over-demand.
- 目标：检验灵活的水能源网通过吸收多余能源产生再生水以及需求过旺时产生能源的潜力
- Motivation: Further integrate urban water-energy grids, make water grid more demand-responsive (long done in energy) and enable more local reliance.
- 动机：进一步整合区域水能源网络，使水电网络能够更加的需求响应（在电网中早已实现）以及是的区域更可靠
- Assess the components of the current water infrastructure to understand which subset of technologies can be responsive to the power grid without compromising security.
- 评估现有的水基础设施组成部分来理解拿一些技术能够在不产生安全问题的情况下响应电网

Project 5.5: Market Characterization of Non - Traditional Waters in California 加州非传统水资源的市场分析

Project Team: Arpad Horvath and David Sedlak; UC Berkeley
项目团队：阿帕德·荷瓦斯、大卫·斯达拉克　加州大学伯克利分校

The CERC research team will prepare a Market Characterization Report that will identify the sources and quantities of non-traditional waters generated annually and/or existing in California.
CERC研究团队的市场分析报告将对加州现有及每年生产的非传统水源的来源和水量进行明确。

The team will research how near term (5-10 years) application of CERC-WET technologies could benefit California.
团队将研究CERC-WET技术如何在短期（5~10年内）对加州有所帮助。