Deployment of renewable energy: The water-energy-food-ecosystems nexus approach to support the Sustainable Development Goals

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UNECE

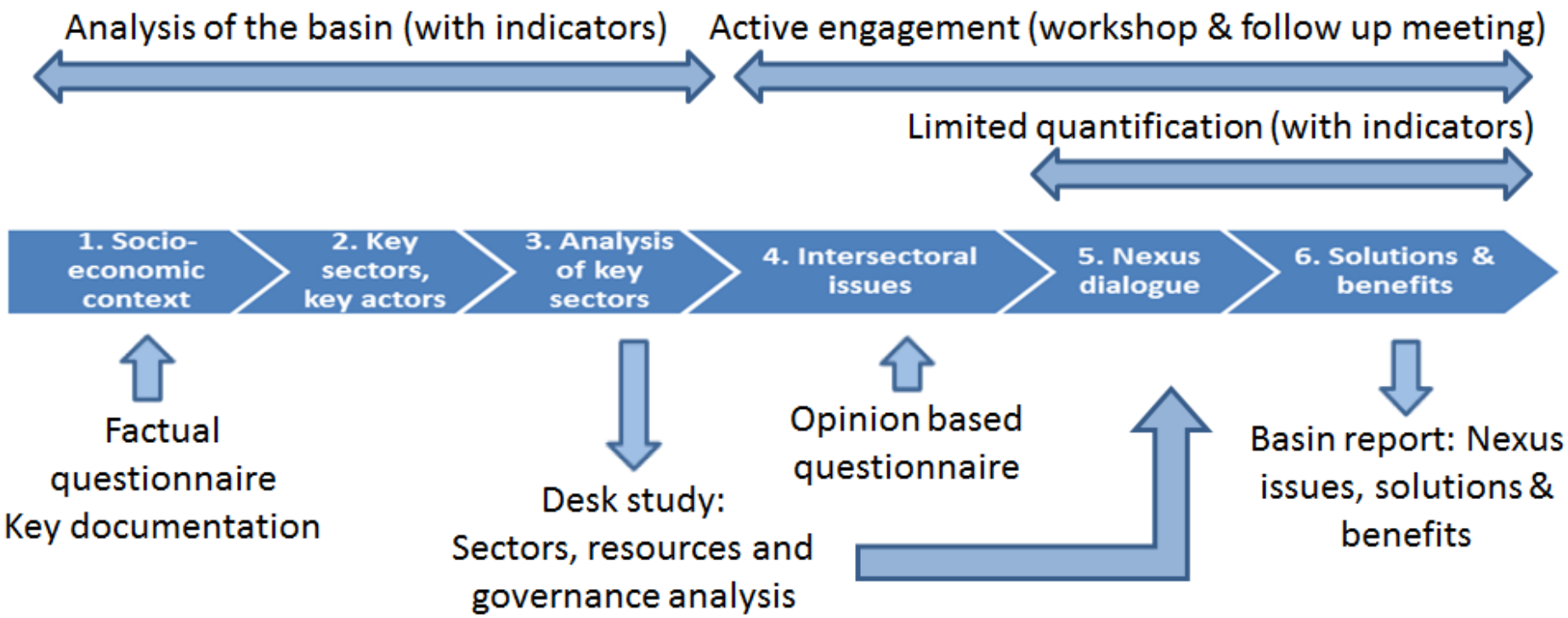
Nexus assessments in the Programme of Work under the UNECE Water Convention

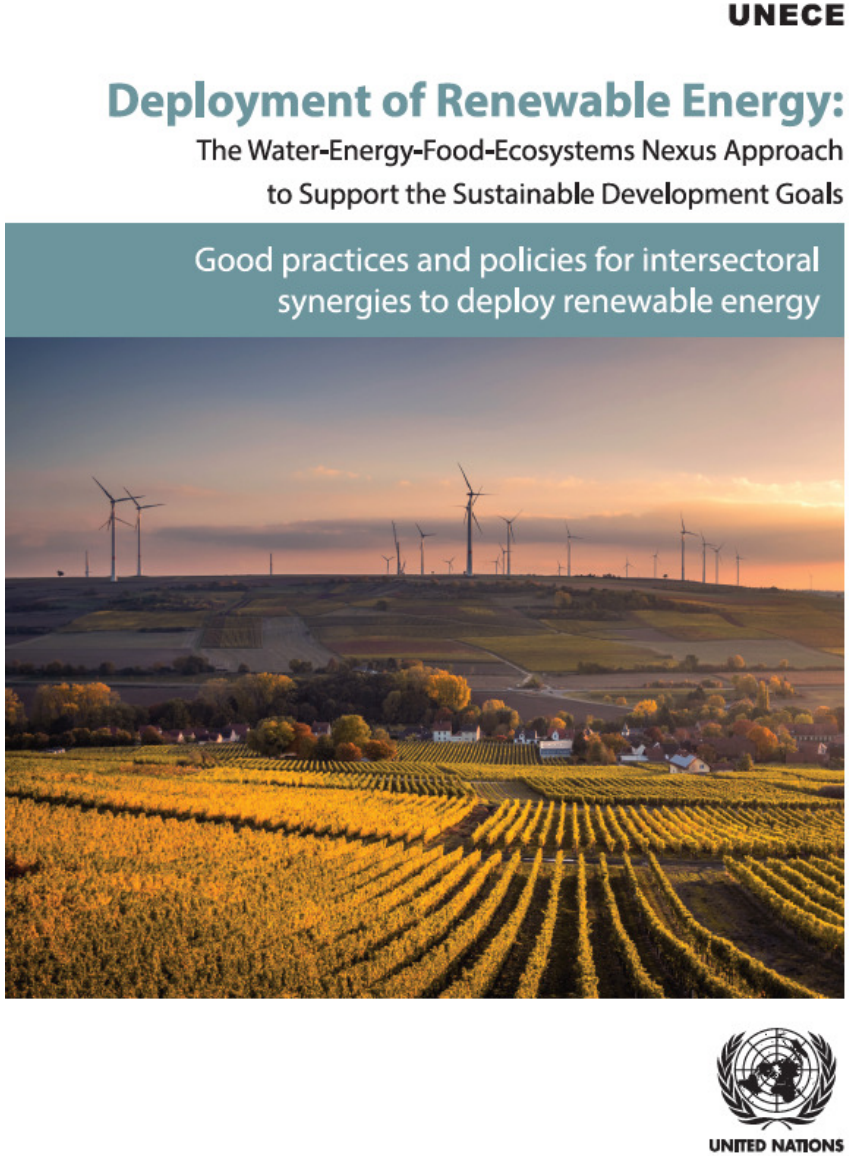
- **2013-2015**: Assessment methodology developed; applied in 4 basins
- **2016-2018**:
  - Publication of full reports from the past assessments
  - basin assessments to foster cooperation: the Drina, Drin (desk based), Western Balkans – selected basins, NW Sahara Aquifer; support to the Niger nexus dialogue (TBC)
  - Cooperation with UNECE Sustainable Energy Division in the Drina assessment, in promotion and outreach

- **Task Force** on the Water-Food-Energy-Ecosystems Nexus guides the work; provides oversight and a forum for exchanging experience: meetings in 8 December 2016 and 18 October 2017 (back-to-back with a workshop on water allocation)

Nexus assessment methodology

- Developed under the UNECE Water Convention (Task Force on the Water-Food-Energy-Ecosystems Nexus)
- Adapts to the context and the specific issues; application to 5 transboundary basins demonstrates value for engaging different sectors into a dialogue
- Provides for identification of cooperative ways to tackle nexus challenges in a non-prescriptive, inclusive and indicative manner highlighting a broad range of potential opportunities.





New policy brochure to highlight opportunities for RES from intersectoral synergies

- Launched in Astana
- Describes nexus and the RES, Tools supporting identification of intersectoral synergies, good practices (focus on innovation), transboundary basin case studies (illustrating concrete synergy opportunities)
- Developed under UNECE Water Convention in cooperation with GERE
- **Calls for integrating intersectoral links and synergies between 1) developing RES and 2) use & protection of water resources and the environment, into energy policies and investment plans**

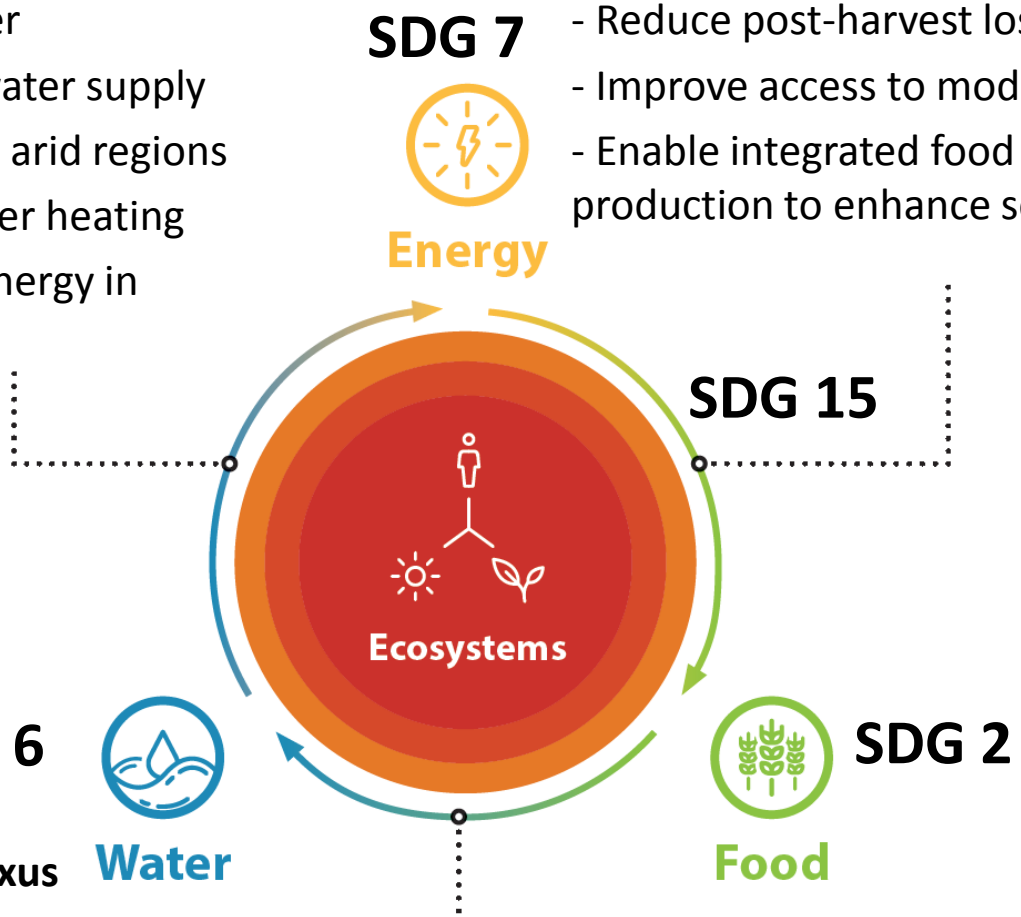
Renewable energy contribution in the different parts of the water-energy-food-ecosystems nexus

Energy/water nexus

- Reduce water-intensity of power sector
- Improve access to water
- Enhance reliability of water supply
- Bridge the water gap in arid regions
- Replace traditional water heating
- More efficient use of energy in wastewater treatment

Energy/food nexus

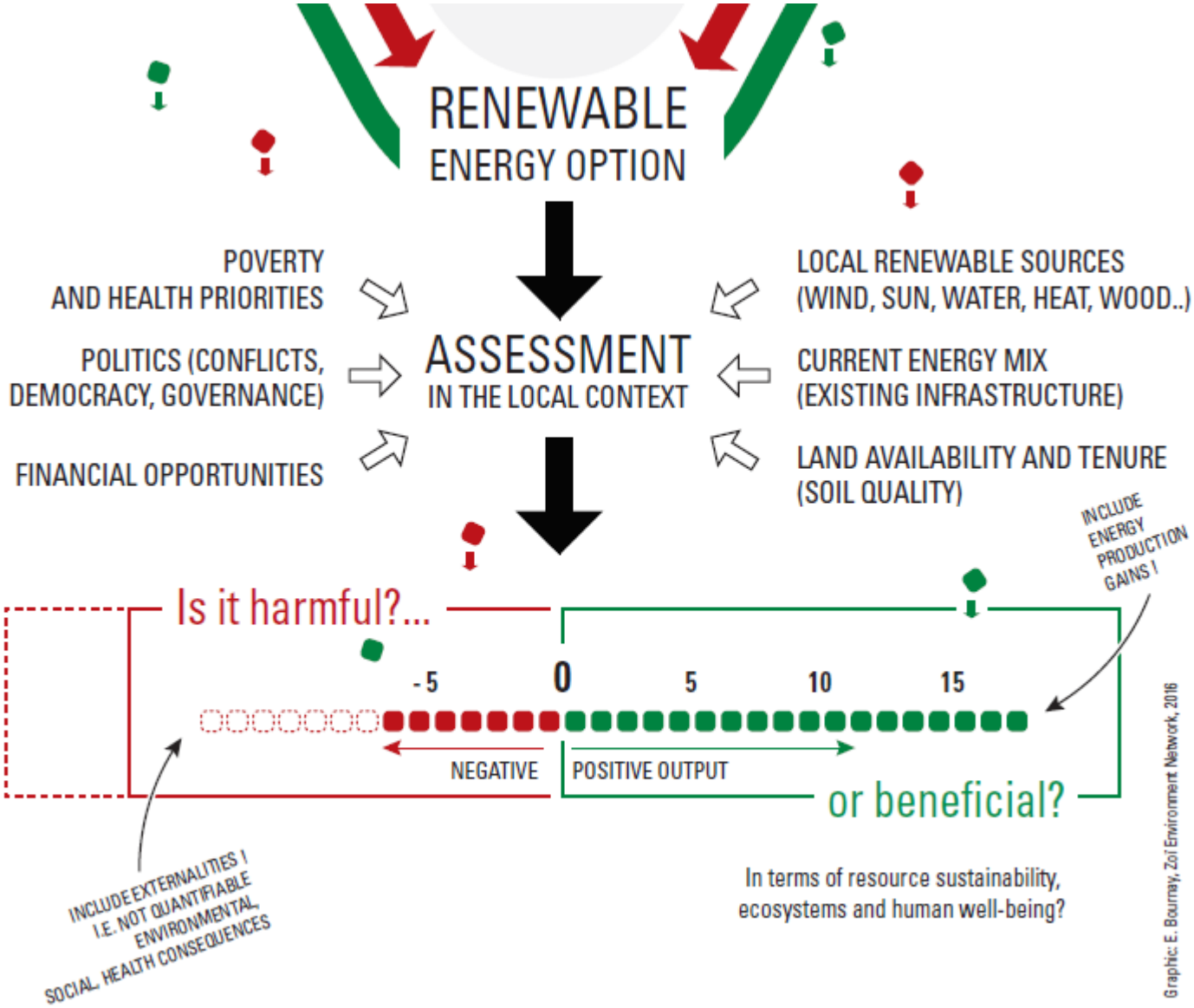
- Decouple agrifood chain from fossil fuels
- Reduce post-harvest losses
- Improve access to modern cooking fuels
- Enable integrated food and energy production to enhance security

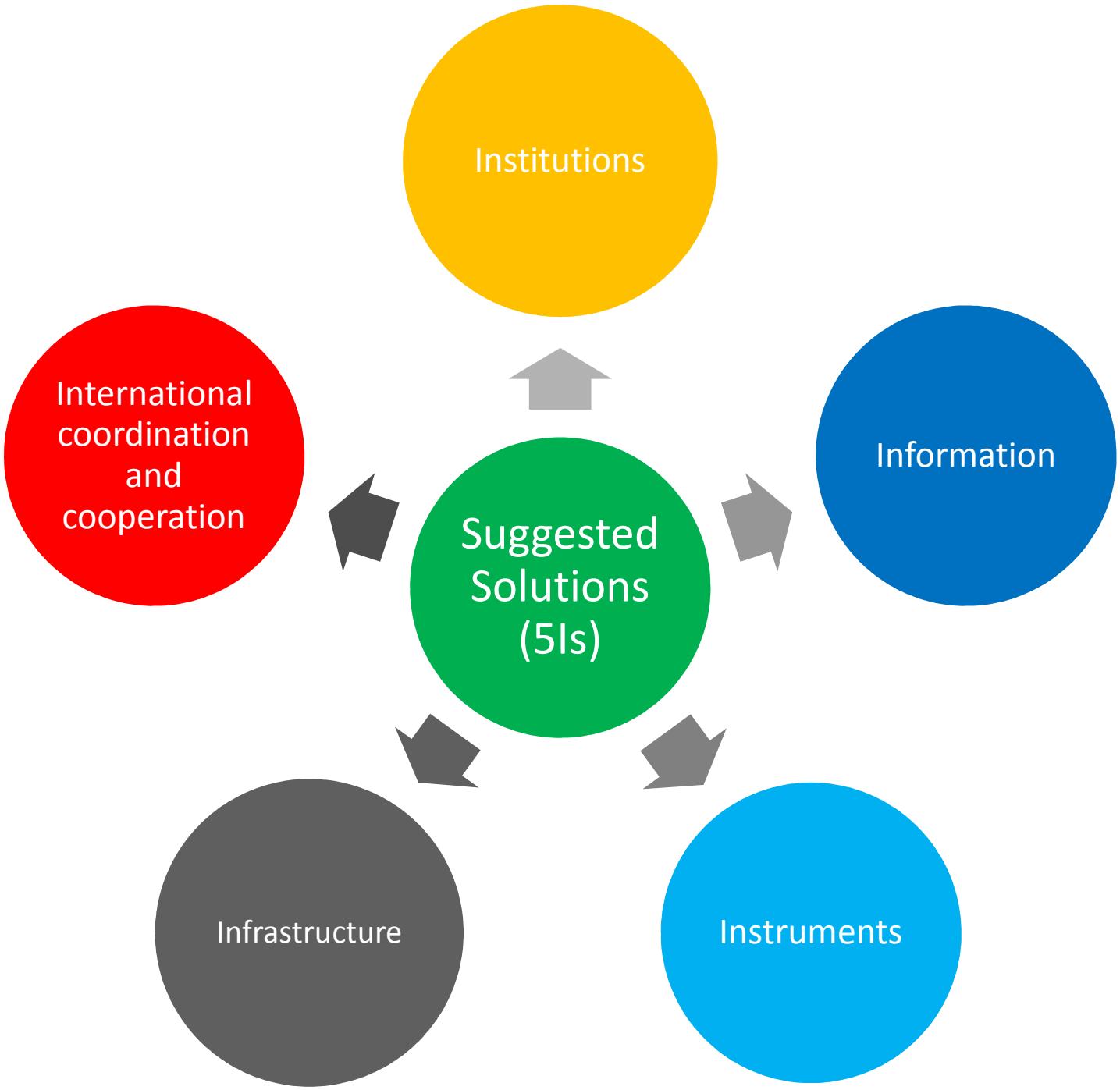


water/food nexus

- Improve access to and sustainability of water supply for agriculture use

Renewable energy can be good for many reasons
Cost, emission reduction, energy security off-grid…




Institutions
International coordination and cooperation
Information
Suggested Solutions (5Is)
Infrastructure
Instruments

Nexus opportunities (examples)

Sava & Drina

Develop hydropower sustainably and integrate other renewable energies; coordinate operation of hydropower plants (for flood control, for energy system benefits) and development of new capacities

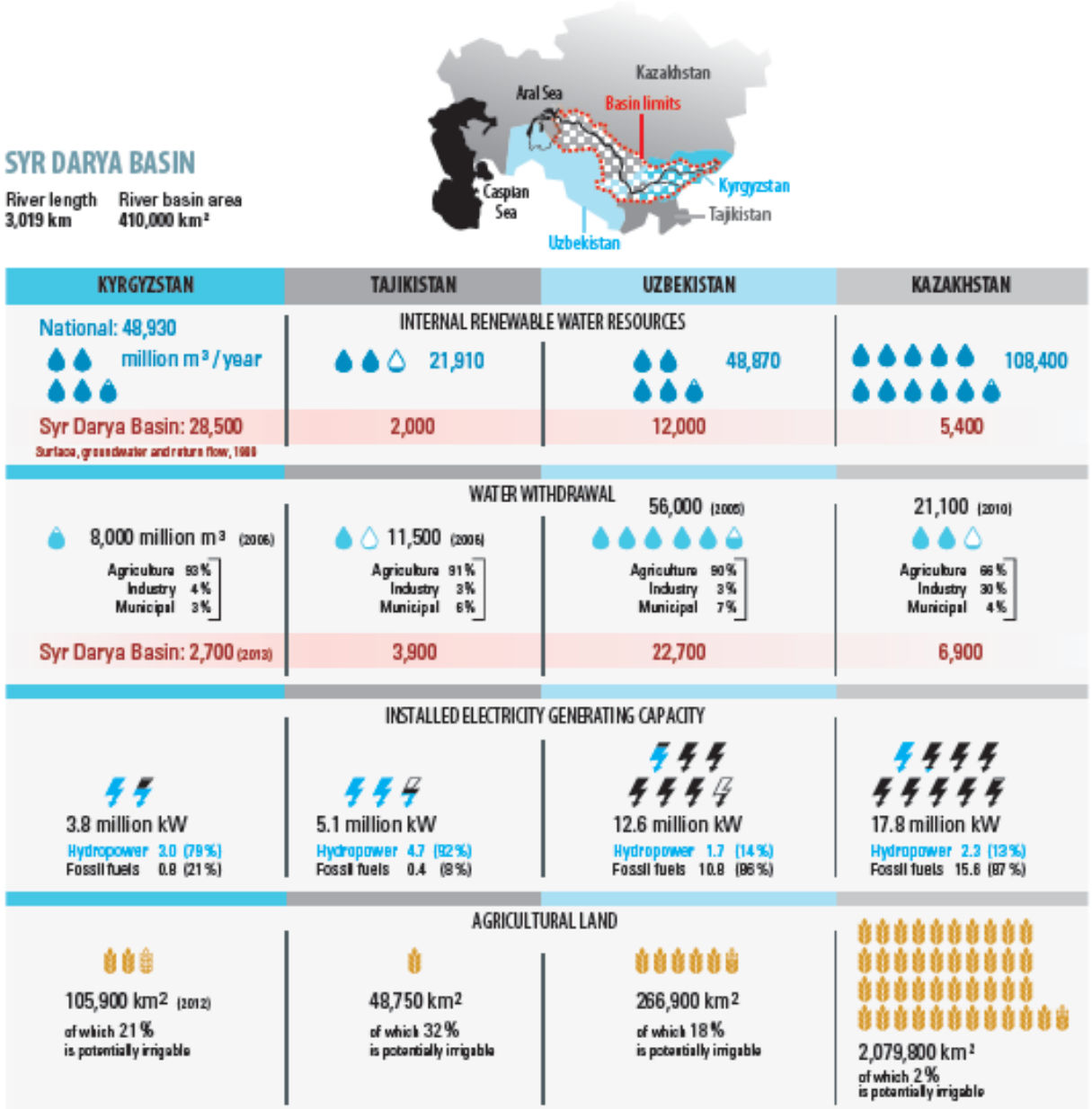
Alazani/Ganykh

Facilitate access to modern energy sources and energy trade; minimize impacts from new hydropower development; catchment management to control erosion

Syr Darya

Promote restoring and vitalizing energy market, develop the currently minimal trade in agricultural products; improve efficiency in energy generation, transmission and use; improve efficiency in water use (esp. in agriculture)

Syr Darya Basin: indicators



Diversity of socio-economic and other benefits from improved Syr Darya basin management through a nexus approach

	On economic activities	Beyond economic activities
From im-proved mana-gement of basin re-sources	**Economic benefits** • Protection & increased viability of economic activities relying on water resources • Increased energy & water supply security • Increased revenues from energy & food exports • More diversified, resilient and dynamic agriculture • Reduced economic costs of water related hazards • Reduction of infrastructure development costs	**Social and environmental benefits** • Reduction of poverty (e.g. through agricultural sector development) • Protection of resource based livelihoods • Health benefits from improved water quality • Increased access to and improved sustainability of energy and water services • Improved status and stability of riverine ecosystems • Reduced greenhouse gas emissions
From in-creased trust	**Regional economic cooperation benefits** • Development of regional markets for goods, services (esp. electricity) and labour • Increased cross-border investments • Multiple infrastructure uses better provided for	**Geo-political benefits** • Improved likelihood of attracting financial resources from development cooperation partners • Compliance with international agreements

Interlinkages in the Drina River Basin: focus on energy

Bosnia and Herzegovina, Montenegro, Serbia

INTERNATIONAL SAVA RIVER BASIN COMMISSION

ENERGY SECTOR

- Current practice of hydropower operation
- Hydropower expansion in the basin and the role of regional projects
- Foreign investments in the power generation sector (cooperation mechanisms)
- Energy security and added potential for electricity exports

CLIMATE

WATER | **ECOSYSTEMS** | **LAND-USE**

Selected interlinkages and solutions in the Drina Basin focused on RES

Interlinkages	Solutions
Water-Energy Pumped storage playing a key role in integrating renewable energy in the grid	• Harmonize legislation related to water resources use for energy and to permitting hydro • Utilize the potential of non-hydro renewable energy to reduce dependence on coal and on water resources
Energy-Food/Land • Potential for installation of small scale renewables in agriculture and eco-tourism • Potential for biomass production associated to the wood industry	• Facilitate access to modern technologies, high-efficiency irrigation in particular • Promote the use of renewable energies in eco-tourism (e.g. solar on rooftops)
Ecosystems-Energy • Ecosystems compromised by expansion of hydropower	• Transboundary collaboration on gathering and sharing information on the status of biodiversity, development and enforcement of common regulations

Selected social, economic and environmental benefits of transboundary cooperation in managing the Drina Basin's resources

Economic benefits

- Increase in electricity production (e.g. by optimising water release regimes)
- Reduced damage from floods and droughts (e.g. by better modelling of flood and drought risk, developing protective infrastructure and cooperating in flow regulation)

Regional economic integration benefits

- Increased transboundary cooperation in all areas
- Increased energy trade and integration, and energy security
- Increased number of people employed thanks to cross-border economic activity

Social and environmental benefits

- Reduced human costs of floods
- Creation of jobs and reduced rural-urban migration (thanks to new economic opportunities)

Some recommended tools for promoting intersectoral coordination in the field of RES

1. Assessment of the water-energy-food-ecosystems nexus with fit for purpose tools
2. Strategic environmental assessment and environmental impact assessment in a transboundary context
3. National environmental standards
4. Policy guidelines for promotion of renewable energy
5. Towards an energy-specific nexus assessment tool: A conceptual framework proposed by IRENA

Main potential benefits of “nexus-aware” RES at the river basin level in general

- Well selected renewable energy technologies could contribute to reducing and optimising water needs in energy production
- Renewable energy could provide a more sustainable energy source in water supply chain
- Off-grid renewable solutions could supply energy to agricultural and food processing activities.
- The nexus assessment could help in making bioenergy and hydropower developments more sustainable by providing insights into their impacts on water, land and ecosystems.
- Taking the synergies and impacts into account in planning and developing strategies can bring about wider application and acceptance to renewable energy, also hydropower where the trade-offs may be more prominent.

Contacts

- Cooperation in UNECE between the Task Force on the Water-Food-Energy-Ecosystems Nexus and the Group of Experts on Renewable Energy (GERE) helps to raise awareness and to share experience about addressing the nexus issues.
- UNECE invites to the nexus Task Force meeting in Geneva, 18 October 2017
- Publications and briefs can be sent for free upon request

More information: http://unece.org/env/water

http://www.unece.org/env/water/nexus.html

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