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Swiss Small Hydro

# IEA TCP HYDROPOWER - Annex XVI

## Hidden and Untapped Hydropower Opportunities in Existing Infrastructures

### Task 1 – Inventories

## Presentation of the task and overview of Switzerland situation

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## Task 1 : Updating Sustainable Hydropower Inventories

Review existing hydropower inventories to identify additional sustainable opportunities, based on new technologies, improved and additional data sets, updated economic criteria, information on regulations and environmental constraints and improved development measures.

**The goal of the task is not to assess the hidden and untapped hydro opportunities in existing infrastructures worldwide, but to give best practices and useful examples to perform this inventory work.**

## Task 1 : Updating Sustainable Hydropower Inventories

- How can we identify the potential ?
- Which tools ? Existing or to be developed ?
- Existing efficient methodologies that can be duplicated ?
- How to reach reliable and useful results ?
- Which parameters have a direct influence on the potential ?
- Identified potential and now, what to do ?
- How to use inventories as a development tools ?

**The idea is to collect fact sheets, case histories and methodologies, in other words to share experience.**

## Task 1 : Updating Sustainable Hydropower Inventories

When	What	Who
11:15 – 11:50	Task 1 – Inventories	Chair: V. Denis
11:15 – 11:25	Presentation of the task and overview of Switzerland situation	V. Denis
11:25 – 11:30	Overview of inventory building and classification of opportunities in USA	C. Hansen
11:30 – 11:40	Some options on inventory works	N. Nielsen
11:40 – 11:50	Discussion - Wrap up	V. Denis

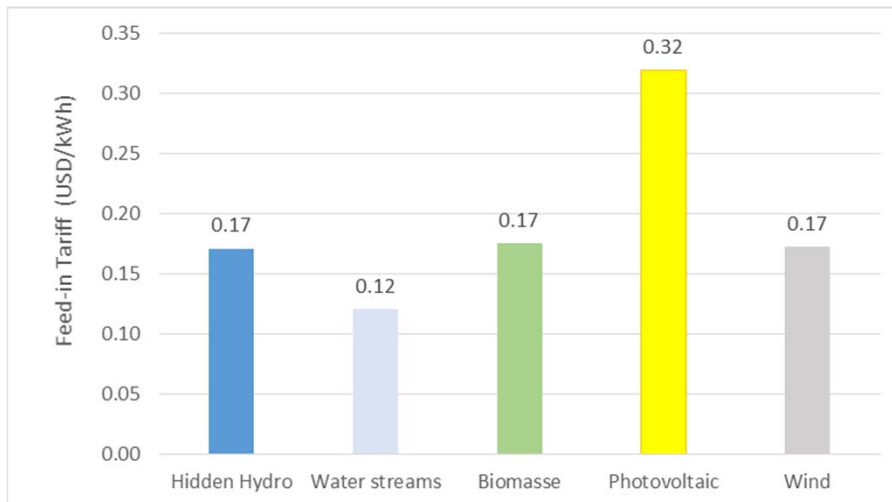
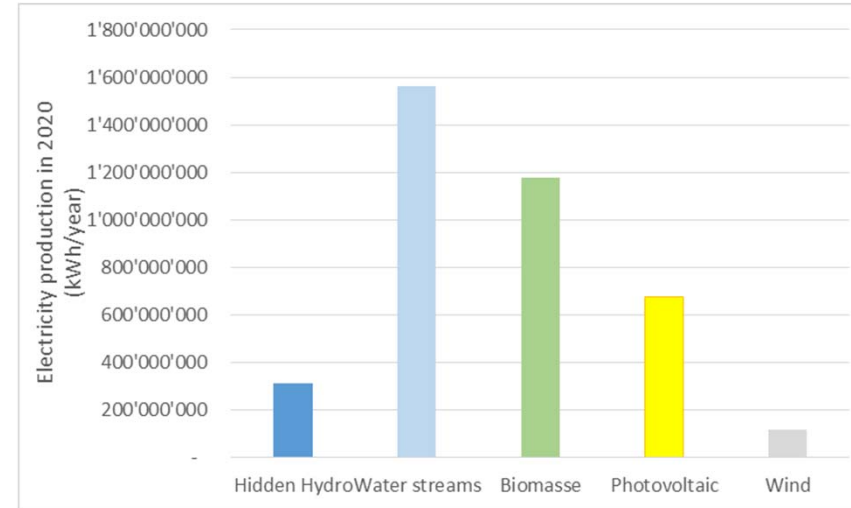
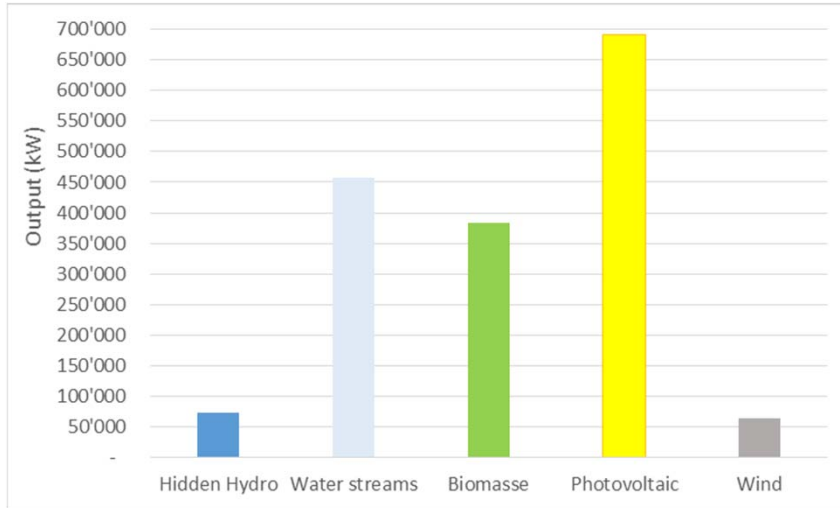
# DEVELOPMENT OF THE POTENTIAL IN SWITZERLAND

## One direct impact: the subsidies level Situation in Switzerland for Hidden Hydro

- The «legal waves» regarding the subsidies:
  - 1992-2005: 1st feed-in tariff policy: fixed price: 0.163-0.174 US\$/kWh, until 31.12.2035
  - **2006-2018: 2<sup>nd</sup> feed-in tariff policy:**
    - variable price function of the head, the yearly production and the waterworks-investment
    - for 25 / 20 years - Max: 0.38/0.41 USD/kWh (depending on the commissioning)
  - **2018: Energy strategy for 2050** (discussed since 2011)
  - **2018-2023:**
    - **3<sup>rd</sup> feed-in tariff policy** (no more available since 2019) variable price for 15 years, Max: 0.35 USD/kWh
    - **subsidies based on the investment only.**

Laws are less strict for hidden hydro / water streams  
(No minimal hydraulic output boundaries – 300 kW & 1000 kW)

# Renewable electricity sources subsidised on the feed-in tariff in 2020

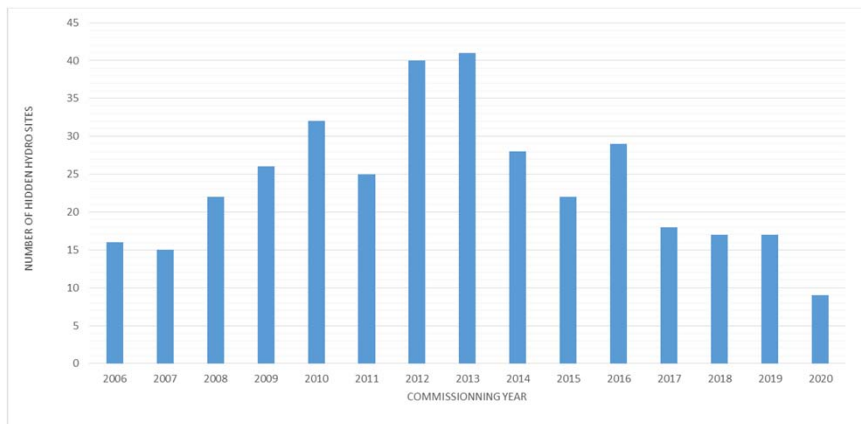
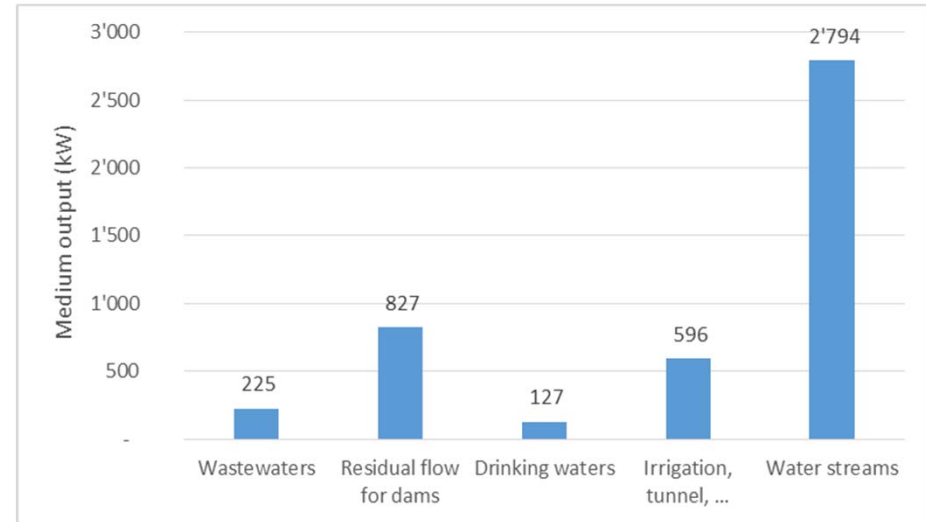
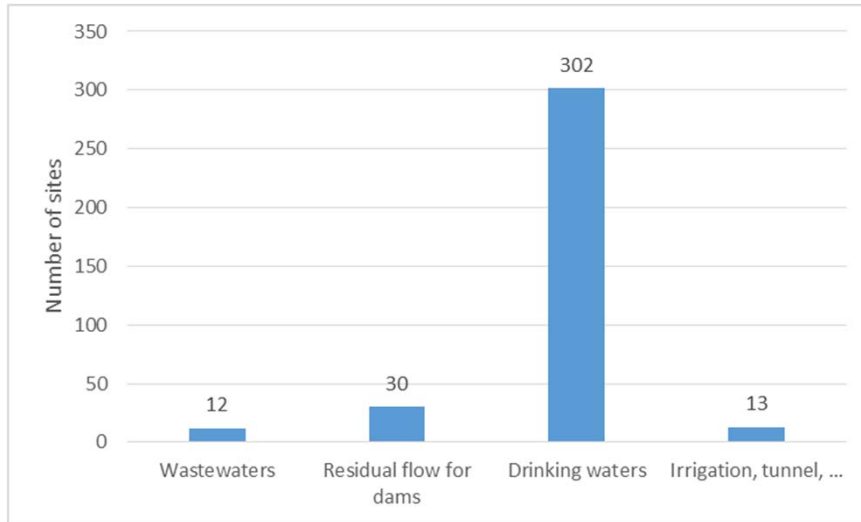


Hidden hydro => small installed capacity but strong and efficient contribution :

Hidden Hydro – 357 sites  
=> 74 MW and 312 GWh

Solar PV – 3913 sites  
=> 692 MW and 677 GWh

# 357 hidden hydro sites with the subsidized Feed in tariff method - 2020



Strong impact of the subsidies policy !

357 hidden hydro sites between 15 years  
=> average of 23.8 new sites per year

In total in Switzerland: about 400 drinking-water sites, 180 GWh/year



- Since 2018
  - For refurbishment: 40 % of the allocable investment
  - For extension: 60%
  - Not for new sites (subsidies on the feed-in tariff)
- No output boundaries for hidden hydro
- Hidden hydro, total figures for 2020:
  - 6 sites (40.0% of the subsidized hydro sites)
  - 8'290 MWh (13.6%)
  - USD 16'908'000 (20.2%)

→ Efficient method?

➤ Potential on **wastewaters** (upstream or downstream of WWTP)

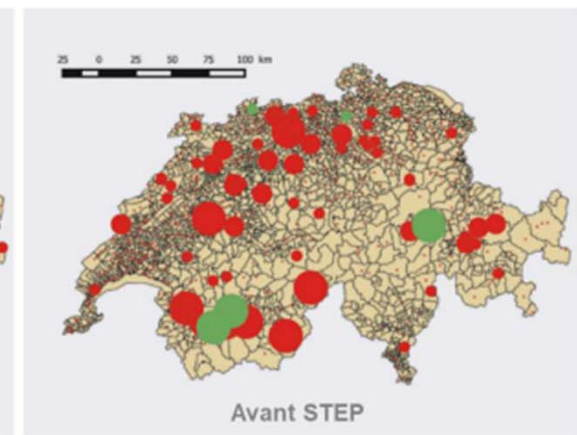
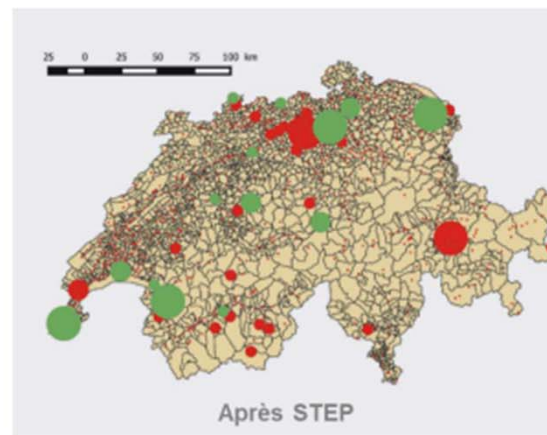
Source: Assessment of hydropower potential in wastewater systems and application to Switzerland, Bousquet, C.; Almeida Samora, I.; Manso, P.; Rossi, L.; Heller, P.; Schleiss, A., 2017 (<https://infoscience.epfl.ch/record/229930> )

➤ Algorithm developed in two phases:

1. to estimate the annual electricity production in selected areas based on GIS data and the inflows to each WWTP
2. to carry out an economic evaluation of the feasibility of each scheme considering local investment costs and local electricity sell tariffs.

➤ Method applied to Switzerland (41'000 km<sup>2</sup> + 8 million inhabitants):

- 19 profitable sites → 9.3 GWh/year
- The possible fusion of WWTP is also considered
- Among these sites, 6 already equipped for hydro production (3.5 GWh/ year)  
→ validation of the methodology



## Inventories tools

- Use of GIS =>
  - Water sources
  - Reservoirs
  - Pipes
  - Electrical grid
- 1st assessment based on water use and average values
- Selection of the most promising sites
- Fact checking and on site assessment

Main difficulty: GIS are not always available and/or complete !

If the considered area is not that big, site inquiries can be made.

- «Energy Strategy for 2050»:  
update in June 2021 + application from 2023:
  - Binding objectives of renewable kWh for 2035 and 2050 (with a special focus on the winter)
  - Total opening of the electricity market
  - Subsidies on the investment (no more on the feed-in tariff)
    - Hidden hydro: for the new sites, the extension and the refurbishment (40% of the allocated investments) / minimal output boundaries for sites on water streams
- Image campagne 2021-2023 led by Swiss Small Hydro
- Charging station for electrical cars
- Local networks
- Self-consumption



# Thanks for your attention!

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