

Jornadas Técnicas da Hidroenergia 2019

Régua, 23 e 24 de maio

Fish installations in Norway - examples

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Agenda

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1 Natural barriers stopping fish prior to the hydro plant

2 Utilisation of fish stairs and electric fences

3 Utilisation of a bypass valve

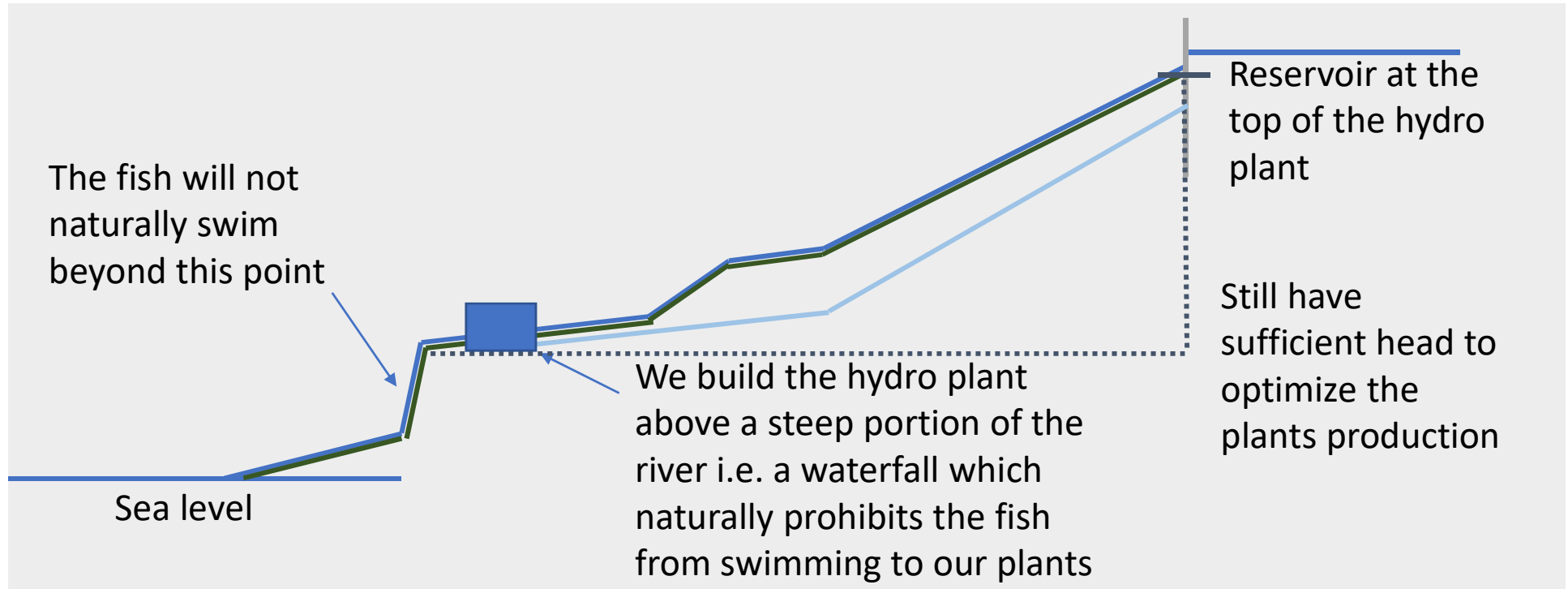
Importance of stopping fish

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- Fish farming is common in Norway and we want to prevent fish lice, which can grow in fish farms, from entering the nature
- We do not want to introduce species into new habitats
- Certain species of fish can be carnivorous and if moved to a new habitat, can kill off another population of fish

1. Stopping fish – natural obstacles



We build the power plant above natural obstacles (i.e. waterfalls) so fish cannot reach it

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Electric fish barriers | Norway

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If there is no natural barrier, we use a electric fish barrier to prevent fish migration upstream

Fish stairs | Portugal

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Fish stairs are utilised if fish can migrate upstream

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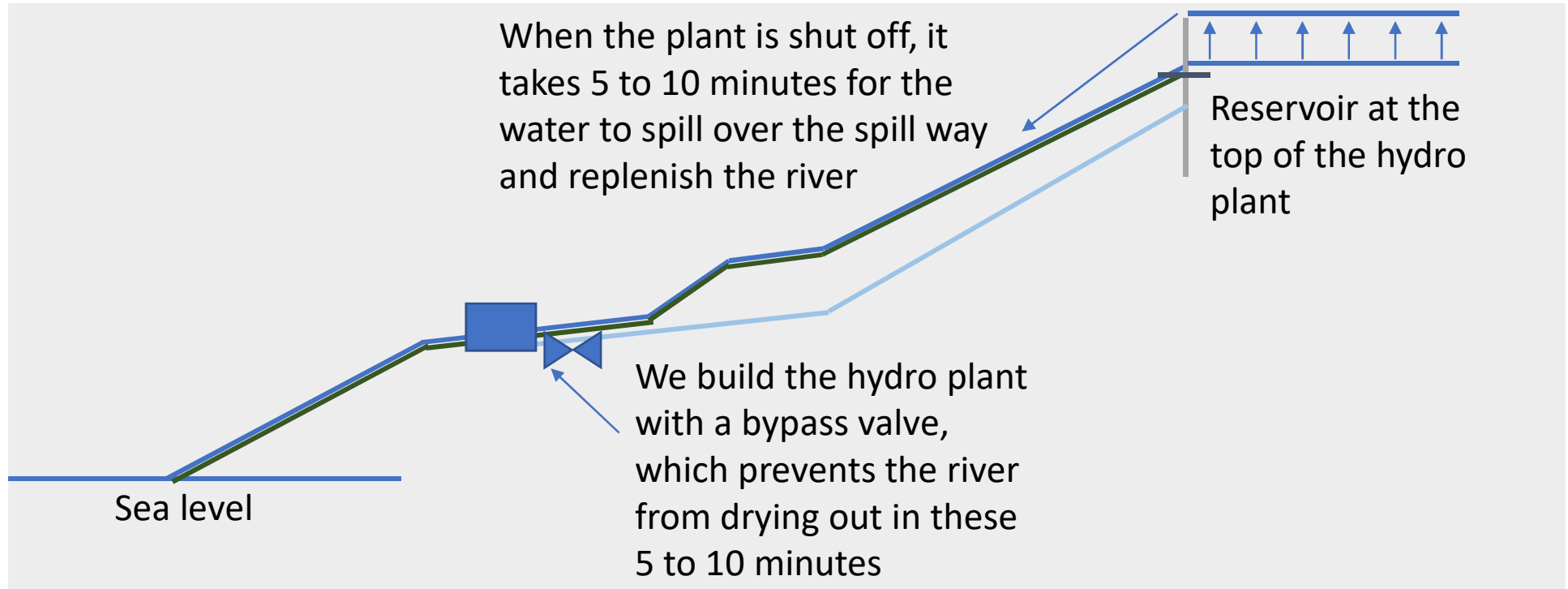


1 Natural barriers stopping fish prior to the hydro plant

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3 Utilisation of a bypass valve

3. Utilisation of a bypass valve



If fish can migrate upstream, we build a bypass valve if the river below the hydro plant can dry out momentarily when the plant shuts off

Aquila Capital's hydro expertise

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As of 31.12.2018 for illustrative purposes

Norway

116 operational plants

>1 TWh annual production

ca. 450 MW installed capacity

2011 first investment



As of 31.12.2018 for illustrative purposes

Iberia

21 operational plants

ca. 300 GWh annual production

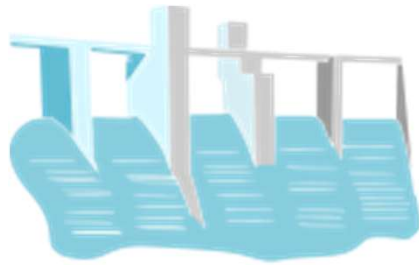
ca. 100 MW installed capacity

2018 first investment

Conclusion



- In Norway it is important to keep fish in their natural habitats, therefore we generally use natural barriers to prevent fish from migrating
- If a natural barrier is not used, we implement electric fences to prevent fish migration
- If its safe for the fish to migrate then we will use fish stairs and/or bypass valves



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