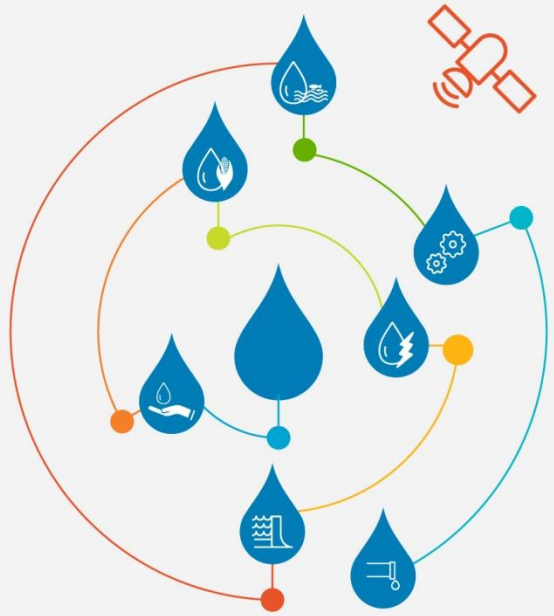
Innovation and Resilience in Managing Scarce Water Resources for United Kingdom



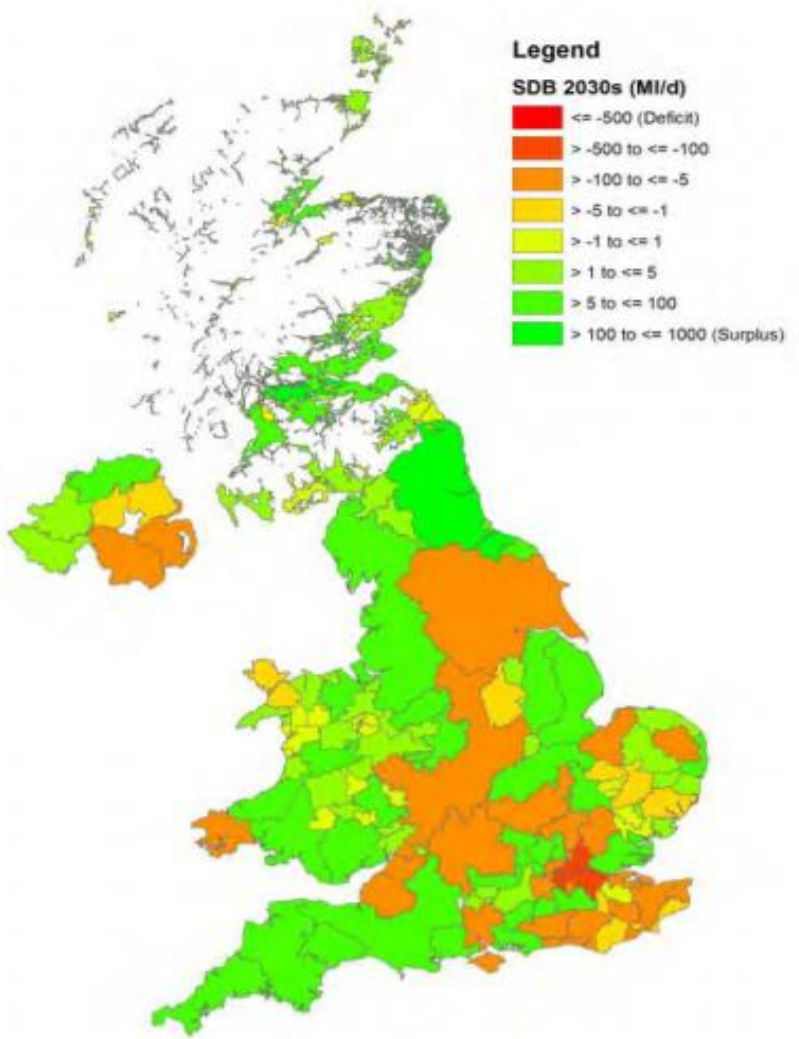
Dr. Mohsin Hafeez

Ricardo Energy and Environment

3rd October 2018

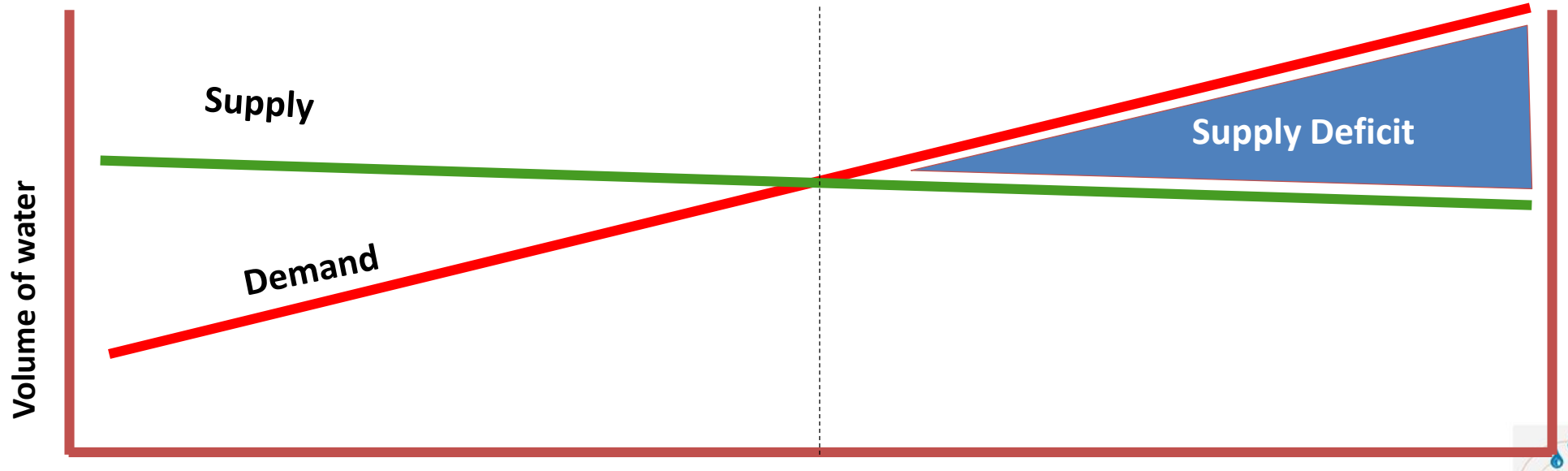
ADB

Water Resources and Climate Change?

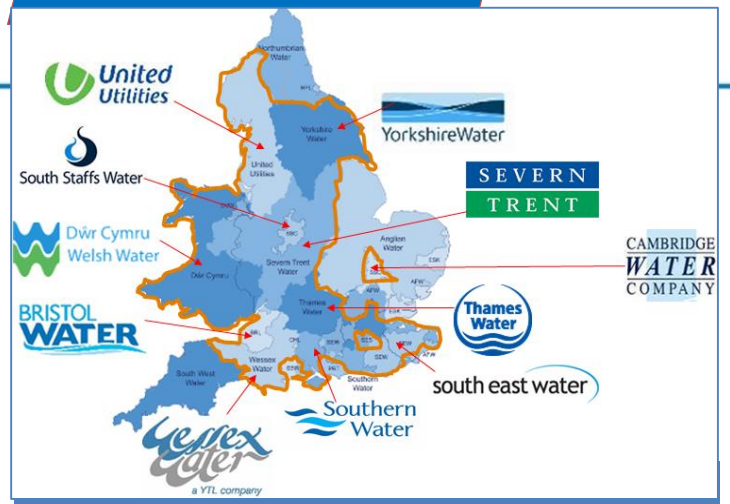


Water Resources Planning- Supply/Demand

- Water Companies are required to plan for (a minimum) 25 years (every 5 years).
- Forms a key part in climate change resilience and adaptation.
- Supply deficits are identified at an early stage, which results in ‘Options Appraisal’.



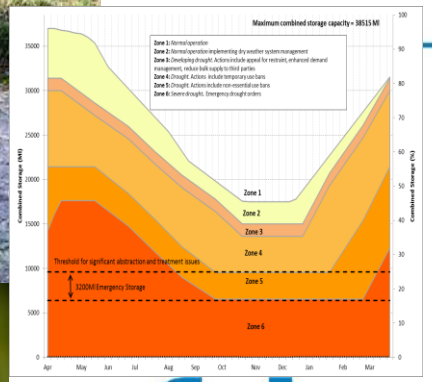
UK Water Companies



Providing strategic water resources planning and operational management services to most of the water companies in England & Wales

- Water Resources Management Plans and delivery
- Drought Plans and implementation
- Regulatory and stakeholder dialogue
- Monitoring and investigations

Our capabilities



wfd Water Framework Directive UK TAG

Strategic Environmental Assessment, Habitats & Water Framework Directives Assessments & EIA

- Assessment of resilience of water supply systems
- Climate and environmental change scenario assessments
- Ecosystem Services & Natural Capital Assessments
- Optimising supply system operations and supply system expansion

Value delivered

- Trusted advisor
- Successful delivery of high profile and challenging water resource schemes
- Ensuring statutory compliance
- Effective engagement with regulators and stakeholders to influence positive outcomes
- High quality science and evidence
- Challenge the status quo – thinking differently

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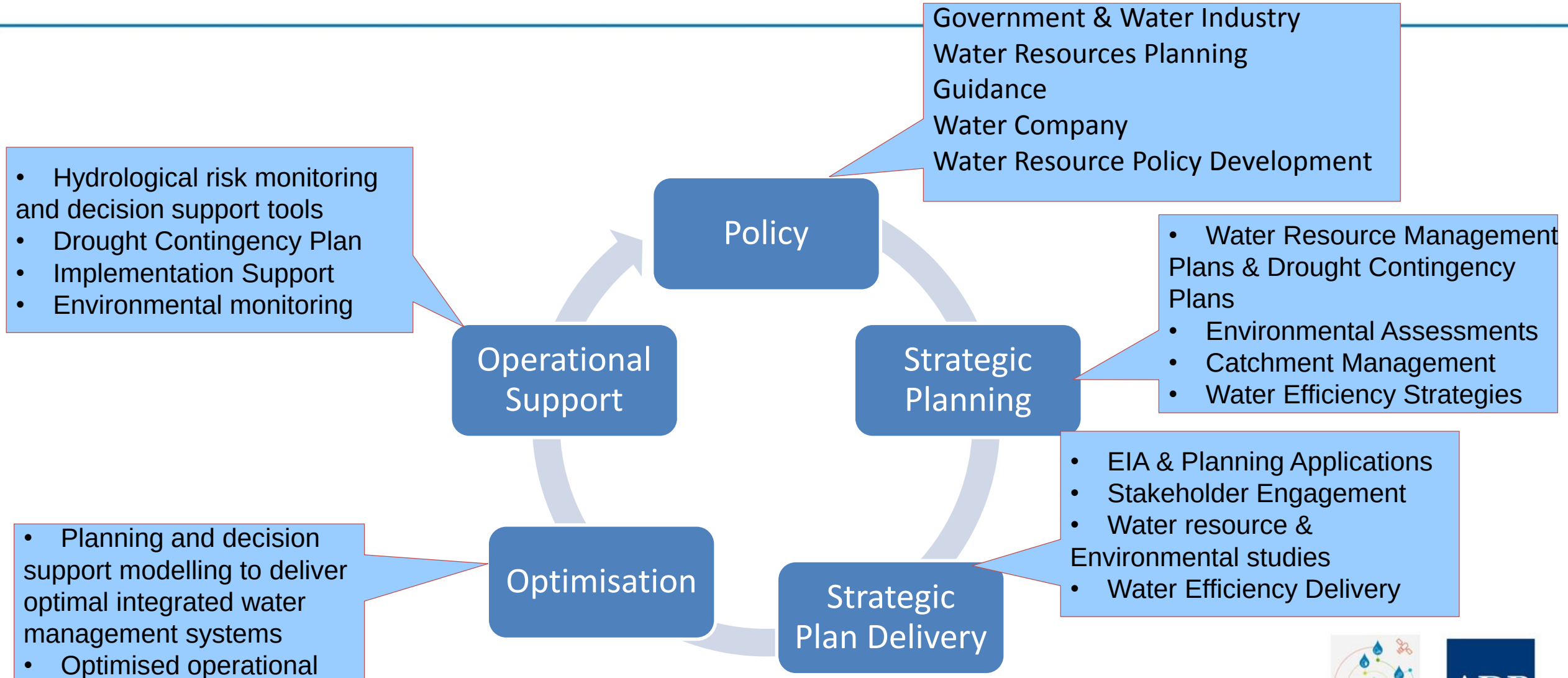
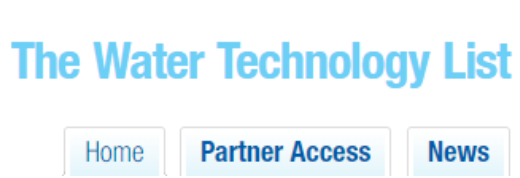
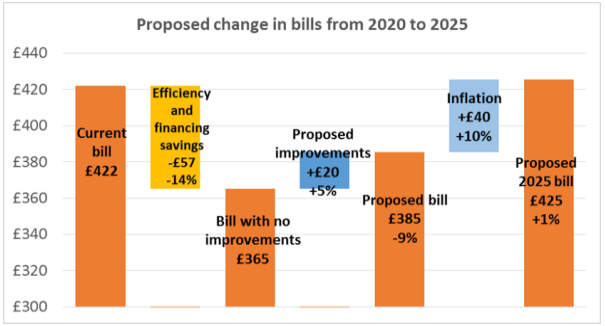
From Policy to Practice

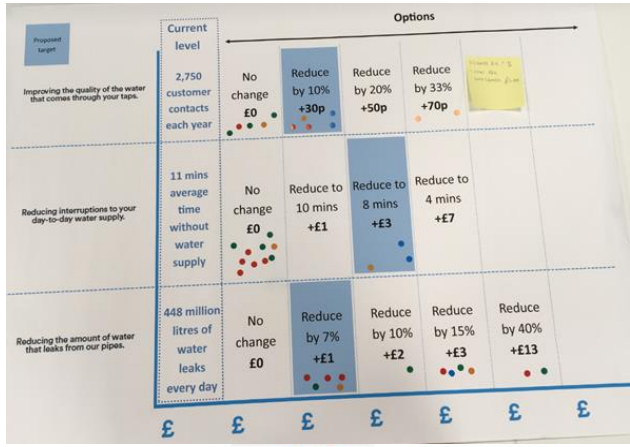


Policy Development

- Government and Water Industry Guidance for Water Resources Planning:
  - SEA and HRA for Water Resources Management Plans and Drought Plans
  - Population, Property & Occupancy Forecasting
  - Water Resources Planning Methodologies
  - WFD Assessment Guidance
  - Drought Environmental Resilience
  - Sediment management guidelines
  - Water efficiency policy and product approvals
- Water company policy development for water resources planning & management:
  - Level of service for water supply resilience
  - Twin-track policy: demand management and supply augmentation
  - Regulatory and stakeholder engagement
  - Cost-benefit assessment of policy options

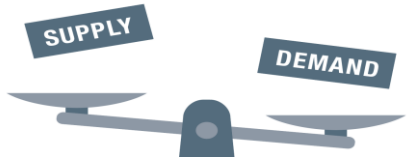






Strategic Planning: Delivery of Water Resource Management Plans

- Demand forecasting and water efficiency strategies
- Water resource yield assessment
- Outage and asset resilience assessment
- Supply-demand balance assessment
- Option appraisal and programme appraisal modelling
- Catchment management strategies & plans
- Strategic Environmental Assessment, Habitats Directive & Water Framework Directive Assessments
- Regulatory dialogue
- Stakeholder engagement workshops
- **Implications of climate change and environmental change on water resources system resilience**



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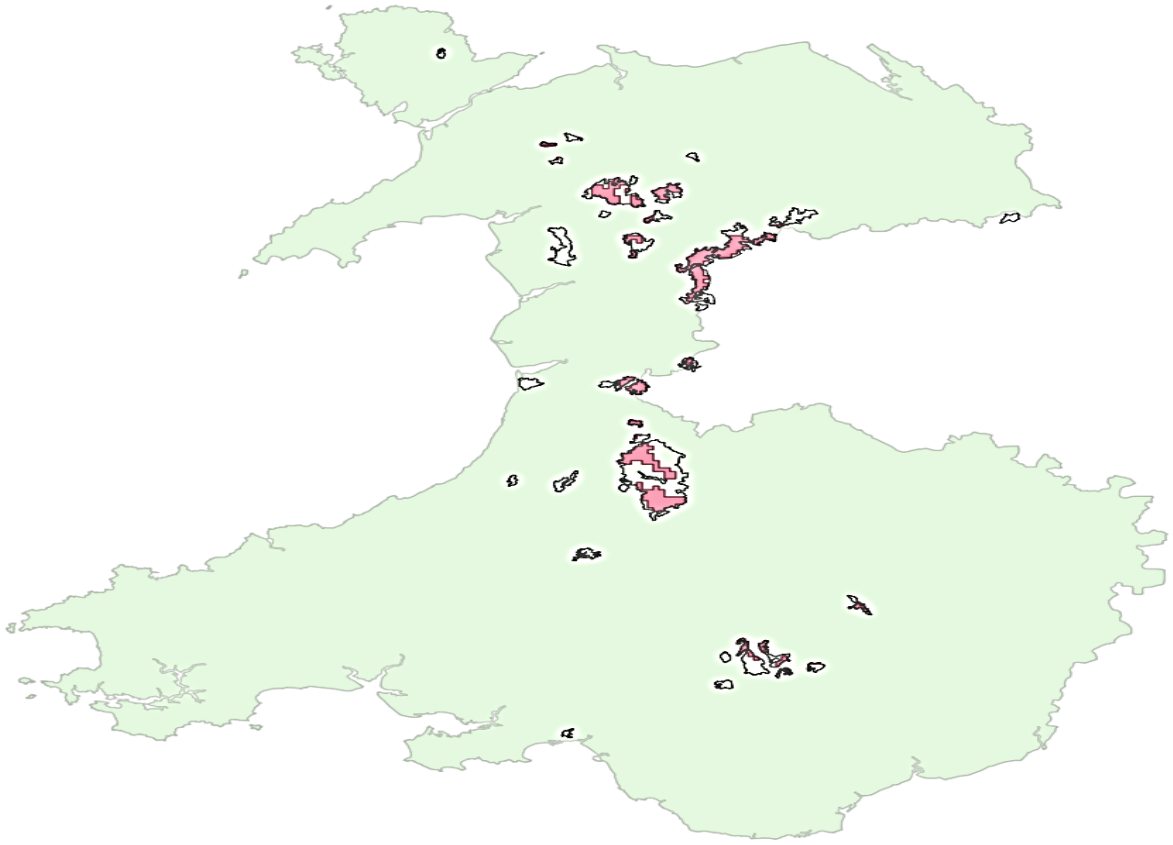
Welsh Water: Climate Change Effects on Water Supply Resilience

- The UK government requires water companies to provide a secure resilient supply of water to their customers
- Increase in the frequency and severity water shortages
- Balancing future demand and supply in face of climate change and its effects on catchment hydrology and water quality
- Scenario testing and assessment of resilience enhancement requirements for water supply catchments

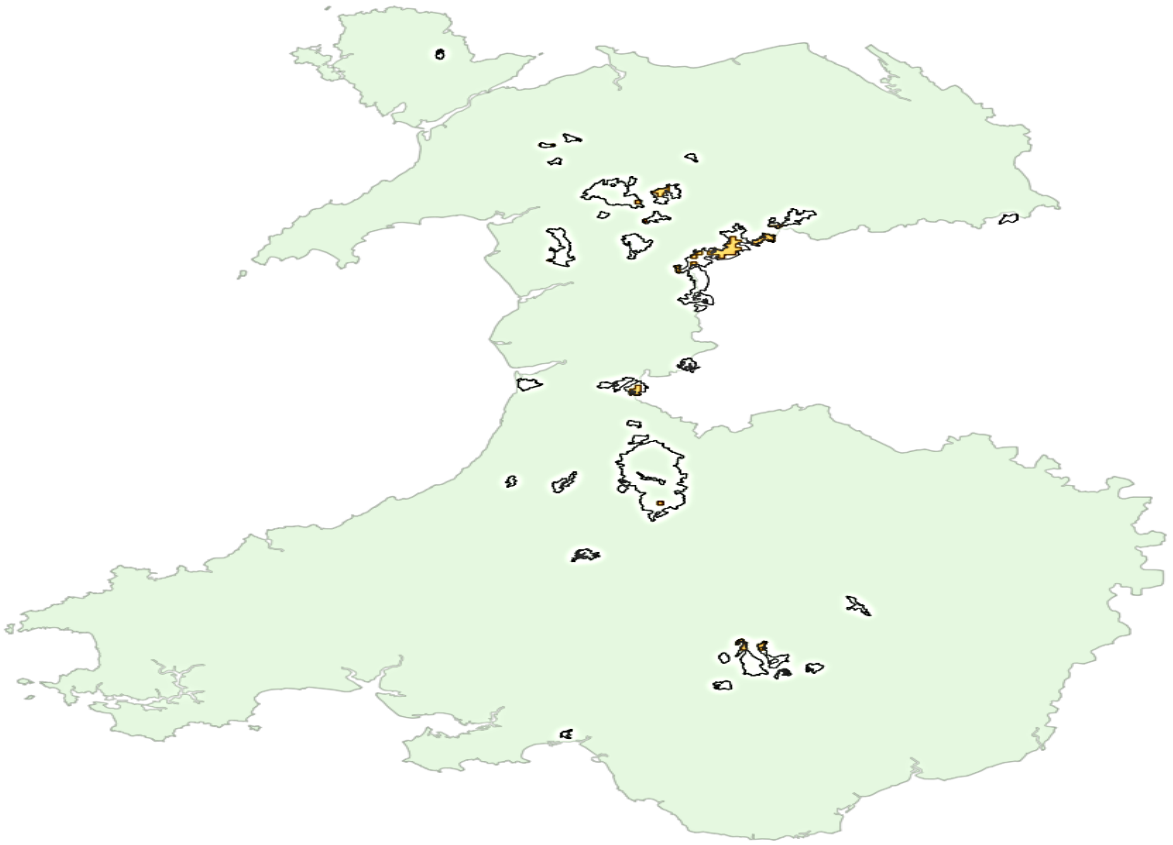
Welsh Water 2050

Welsh Water Case Study: Environmental Consequences of Climate Change

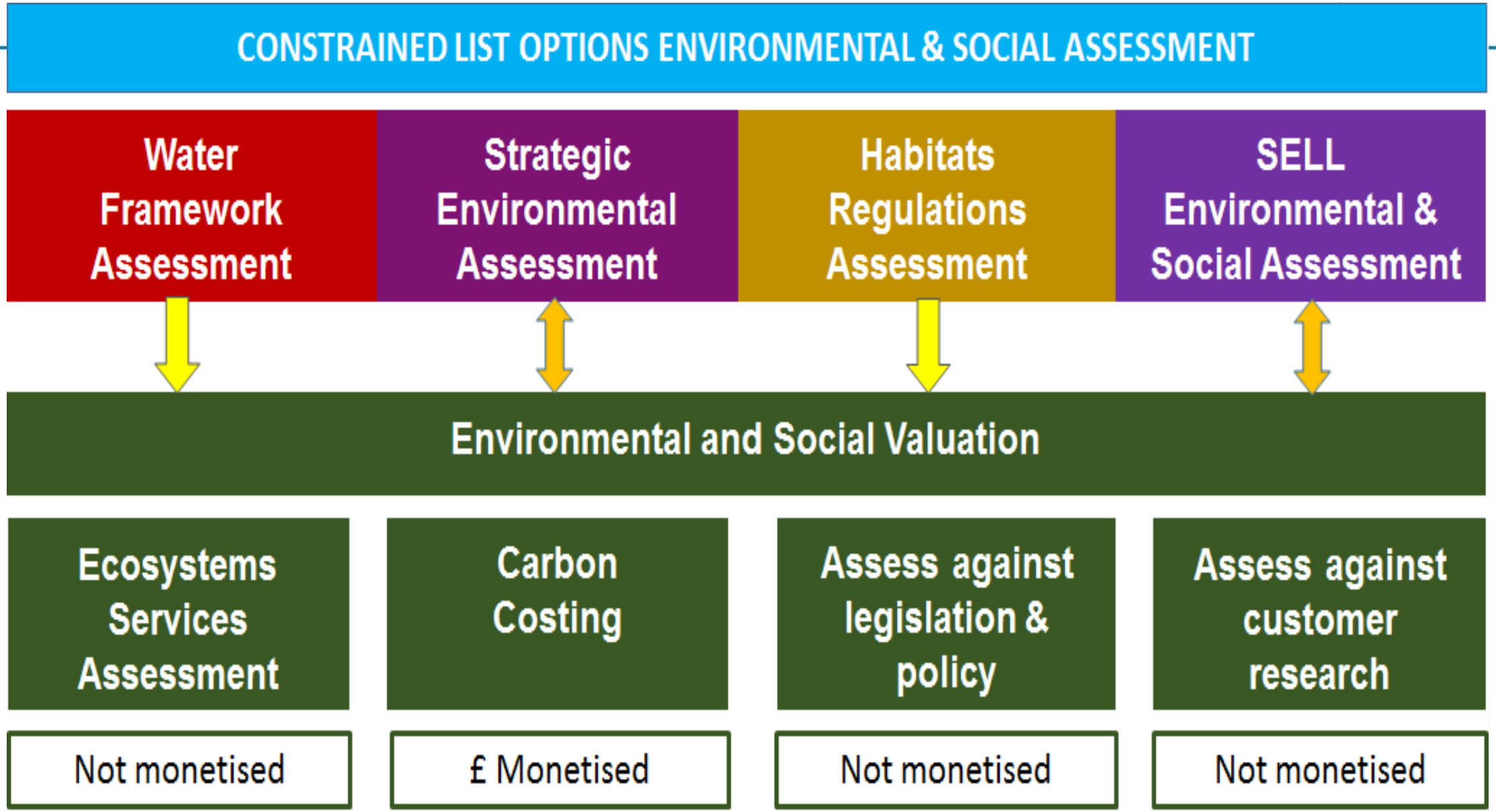
2050 low emission scenario peat area within climatic threshold



2080 low emission scenario peat area within climatic threshold

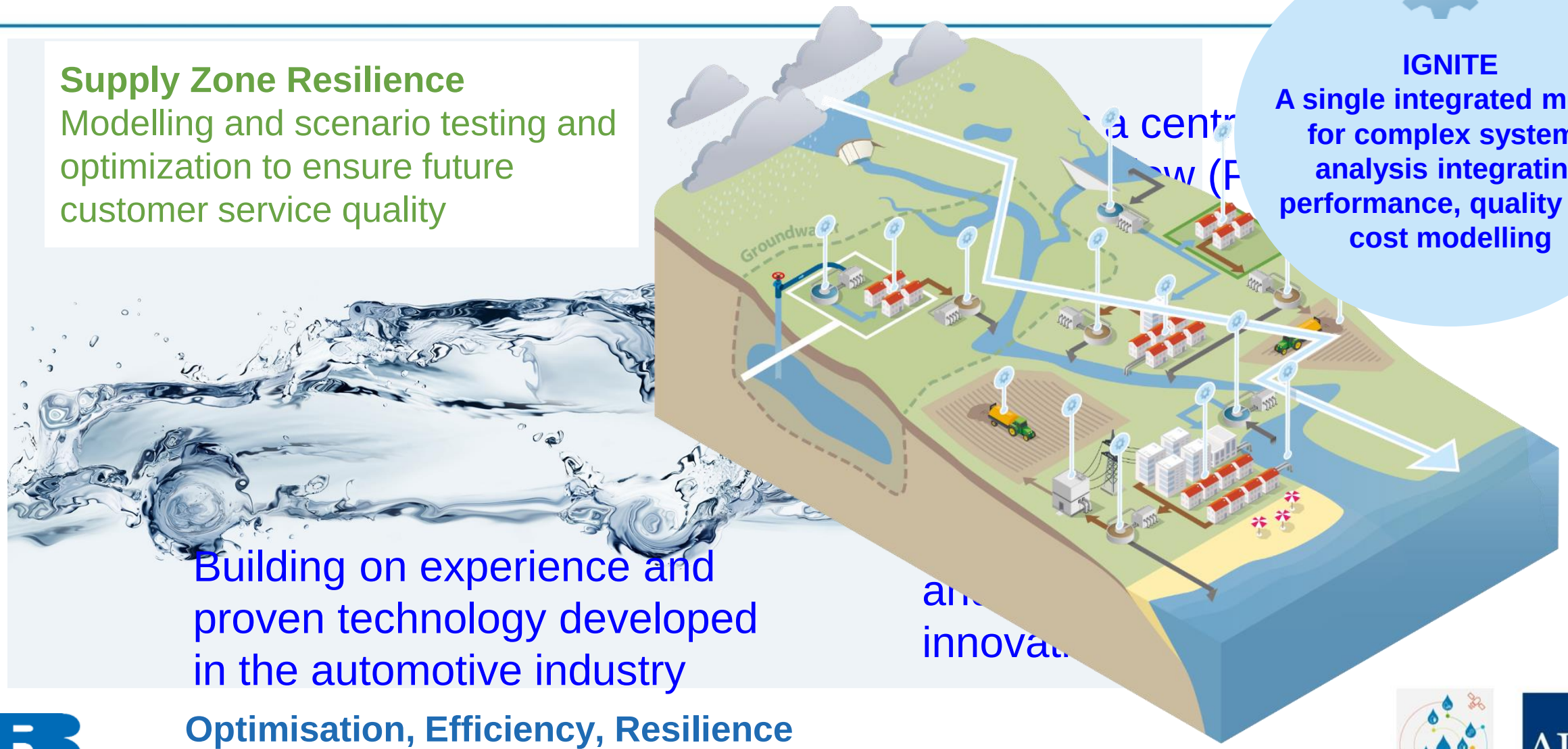


Natural Capital (NC) and Ecosystem Services (ES)



Thirst for Innovation

Supply Zone Resilience
Modelling and scenario testing and optimization to ensure future customer service quality



IGNITE
A single integrated model for complex systems analysis integrating performance, quality and cost modelling

Building on experience and proven technology developed in the automotive industry

Optimisation, Efficiency, Resilience

Enabling Conditions for Innovations in Asia Pacific

- Holistic water resources assessment using forecasting future water supply availability and water demand including impacts of climate change
- Water company is developing the water resources plan for all mega cities which typically lack up-to-date information on:
  - Current water consumption and future water demands
  - Status of urban water infrastructure conditions
  - Climate change impact assessment for future
- Identifying champions from regulatory agencies and water companies for adopting and implementing best practices to develop plans including:
  - Resilient to future stresses
  - Develop new water resources
  - Incorporating better ways to manage climate change.

Scale-up Innovation in Water Resources

- Skilled manpower in national water agencies - forecasting water supply and water demand.
- Understanding the resilience of urban water resource and water supply systems using hydrological modelling under various scenarios (floods and droughts).
- Better governance
- Identification of risks (e.g. pollution and asset failures) for urban water infrastructure assets through application of resilience assessment.
- Identifying champions from regulatory water agency and water company for applying best practices suitable to local conditions to develop and implement sustainable water resources management plans.