

BRITISH HYDROPOWER ASSOCIATION

ANNUAL CONFERENCE 2007

BIRNAM, PERTH

OCEAN ENERGY

TIDAL POWER

CHALLENGE FOR BHA

- Climate Change & Carbon Emission Mitigation present challenging opportunities
- Measures involving HYDROPOWER cover very small to VERY LARGE
- BHA has traditionally concentrated on small hydropower and championed Scottish achievements
- – *here is a new era! TIDAL POWER*

INDICATIVE CARBON BENEFITS

- Total carbon mitigation benefit from hydro now of order of xxx million tons CO₂ /year: UK total target yyyy/year
- Renewables as a whole under present policies might achieve in this decade zzz tons /yr with hydro m% only.
- Proper inclusion of today's HYDROPOWER REALITY
– Barrage Tidal Power – greatly increases impact of renewables to nnn tons/yr with hydro contributing g%

HYDRO/TIDAL POWER IMPERATIVES

- UK set ambitious targets but despite the dash to WIND the 2020 aims will not be met!
- Question must be posed “Are we truly serious in our approach to CO₂ mitigation ?” How much is political wind!
- Omission till now of Tidal Power as a strongly supported option indicates that “mega projects” are not favoured
- Fortunately SDC has been called on to sharpen focus on the Severn Barrage as an option, reporting this autumn
- BHA has a duty in representing UK Industry in strong support of those findings of SDC positive for tidal power

THE WORLD OF TIDAL POWER ASPIRATIONS

- Globally, Tidal Power linked with France, Canada, Korea Russia, UK, India, Australia, Alaska -- all with high tides
- UK, despite having no existing Tidal Generation, is widely recognized as having a leadership in the technology
- Leading expertise and engineering studies, technical developments, mega project capability, all stem from UK
- UK strengths and resources could bring 16 million tons per year of CO₂ mitigation in perpetuity within 15 years
- This, with utterly predictable energy deliveries, sea flood protection, transportation/regional benefit, and sustainability
- No action will lead to shortfall in UK international obligation to lead in achieving full measure of mitigation opportunities

TIDAL POWER CHARACTERISTICS

- Lunar effects creating tides provide everlasting power/energy from both potential and current streams
- High tidal ranges occur in latitudinal zones mostly in band 45 to 55 degrees north [and equivalent south.
- Extreme tidal ranges are created by topographic form of estuary shores and bottom shapes
- Tidal ranges of 11 to 12 meters can occur [as in Severn Estuary] but in geographical sense are notably local
- In UK tidal effects diminish northwards from Severn 11m to 8.5 m in Mersey, to 6-7 m in Solway and 3-4 m in North

READINESS AND SCALE OF TIDAL POWER

- In relation to other forms of ocean energy generation Barrage Tidal Power is relatively mature
- Barrage plants are already in operation and successfully performing their design functions
- Scale of development for maximum economy should be at the scale matching current “mega project” limits
- The desperate need for action so loudly proclaimed by Government/Global committees demands proper response
- Barrage Tidal Power can be of a scale that makes an effective and measurable impact with proven technology

PLUSES AND MINUSES

- Most of the Tidal Barrages proposed today have multiple benefits but disbenefits provoke more public attention
- Kalpasar, India's current tidal priority, is aimed at water supply for 13 million deprived people of Saurashtra
- Korean tidal estuary barrages are to facilitate transportation routes and make better use of water supply
- Northwest Australia sees tidal energy as relief from costly reliance on long-haul oil
- Alaska now oil dependent sees value in renewable tidal energy from generation units in transport causeway
- In UK's Severn Estuary new attention is focused on flooding issues and possible mitigation by a tidal barrage

TIDAL POWER MINUS SENSITIVITIES

- Sediment and morphological change
- Fish habitat and livelihood
- Inter-tidal zone bird preservation
- Bird migration
- Municipal infrastructure impacts
- Navigation need for ship locks and port impacts
- Agricultural land drainage
- Estuary water level changes affecting sea access
- Jurisdictional complexity in region

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LIMITS TO TIDAL ACHIEVEMENTS

- Commercially viable potential can be associated principally with the near maximum tidal ranges and not below 5 m
- Tidal stream effects are similarly influenced and may be affected too by sea bed configuration e.g. Pentland Firth
- Are "Tidal Possibilities" endless? Practically, NO!
Extractable tidal energy is finite and economically limited.
- A nation with 5 to 10% of total current electrical demand met by tidal sources would be well endowed for 50 years
- Necessary level of construction skill and achievement is achievable today and steadily advancing in marine field
- Possibility of tidal achievements advancing year by year as global pressure for large scale CO₂ mitigation builds up

CONCLUSIONS AT FULL FLOOD TIDE !

- Barrage tidal our most powerful renewable source
- High tides favour western shores of UK
- Tidal power sources are close to high demand
- System in UK can absorb cyclical power supply
- Cross estuary transport benefits are high
- Barrage safeguard against long term ocean flood risk
- Impacts proportional to scale of contribution of mitigation
- Failure to proceed would weaken UK global commitments
- Progress would be hailed internationally as positive step
- Tides are perpetual and inherently SUSTAINABLE