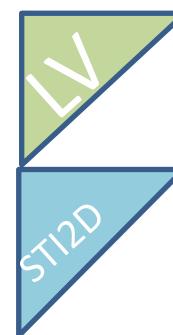


CO-ENSEIGNEMENT

STI2D et LANGUE VIVANTE

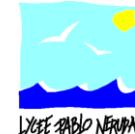
Une étude de cas en Première STI2D :
PUMPED STORAGE HYDRO-ELECTRICITY



Christine Brélivet, professeur d'anglais

Pierre-Louis Corrieu, professeur de sciences et techniques

Lycée Pablo Neruda
DIEPPE



OBJECTIFS PEDAGOGIQUES

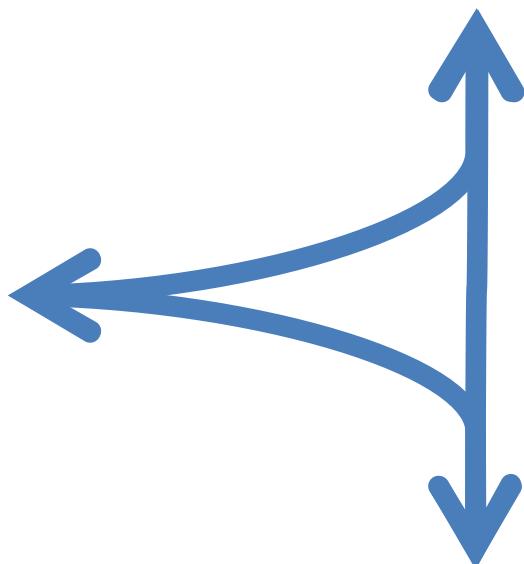
TECHNOLOGIE

Société et développement durable

O1

Technologie
O4

Communication
O6



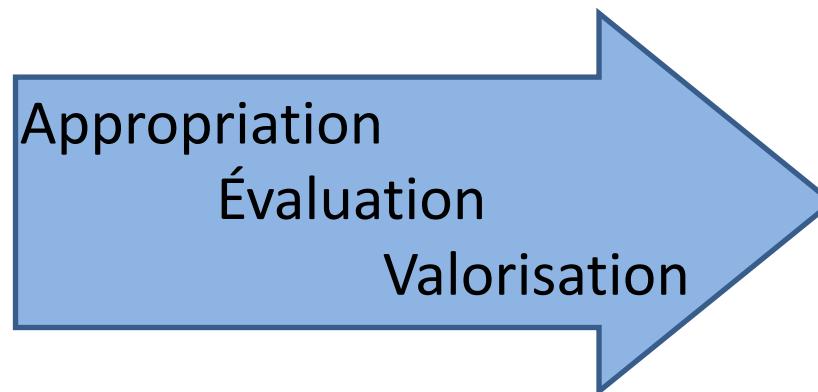
ENSEIGNEMENT CONJOINT

Notion culturelle : Idée de progrès

Pôle de connaissance : Energie et environnement

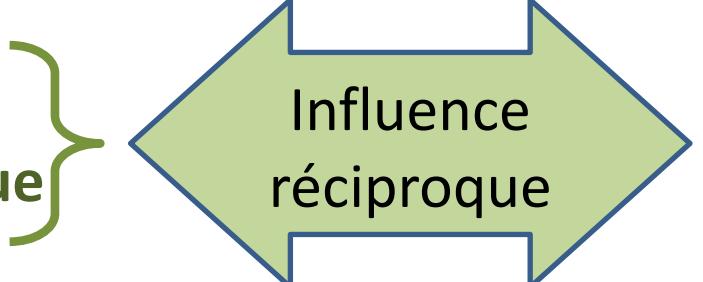
Croisement co-enseignement : Efficience énergétique

- Problématique technique



Principe technologique

- Progrès
Demande énergétique



Modes de vie

« **TV pickup** »

OBJECTIFS PEDAGOGIQUES

LANGUE VIVANTE

- PRE-REQUIS POUR L'ENSEIGNEMENT CONJOINT
- DIMENSION CULTURELLE
- COMPETENCES CECRL

COMPETENCES CECRL

En co-enseignement :

Activité 1

CE niveau B1 : **localiser des informations recherchées ou pertinentes pour s'informer et réaliser une tâche.**

EO niveau B1 : **restituer une information** avec ses propres mots éventuellement à partir de notes.

Activité 2

CE niveau B2 : **comprendre des instructions longues et complexes dans son domaine**

IO niveau B1 : **prendre part à une discussion** pour expliquer , commenter ,comparer et opposer .

Activité 3

CO niveau B2 : **comprendre l'essentiel d'un exposé complexe**

EO niveau B2 : **développer un exposé** de manière claire et méthodique en soulignant les éléments significatifs

Activité 4

IO niveau B2 : **développer idées et opinions** de manière précise à propos d'arguments concernant des sujets complexes ;argumenter et réagir aux arguments d'autrui.

EE niveau B2 : **écrire des lettres / écrire un rapport** qui développe une argumentation en apportant des justifications pour ou contre un point de vue particulier et en expliquant les avantages et inconvénients de différentes options.

En cours de langue : mêmes compétences que dans le cours conjoint

+ CO B2 « **comprendre un documentaire en langue standard** »,

+ CE B2 « **comprendre des articles ...sur des problèmes contemporains... »** et aux séances 5 et 6 :+

+EE B2 « **écrire des textes clairs et détaillés ...en faisant la synthèse et l'évaluation d'informations et d'arguments empruntés à des sources diverses ».**

TECHNOLOGIE :

« PRODUCTION HYDROELECTRIQUE »



En amont :

- Conversion d'énergie / réversibilité énergétique
- Machines tournantes
- Réseau électrique
- Barrage et turbinage

Activité de comparaison
Sélection des critères pertinents
Ordres de grandeurs

2.1.1 Organisation fonctionnelle d'une chaîne d'énergie				3.2.1 Transformateurs et Modulateurs d'énergie associés		
Caractérisation des fonctions relatives à l'énergie : production, transport, stockage, transformation, modulation, variation	*	1 ^{re}	3	Adaptateurs d'énergie : réducteurs mécaniques, transformateurs électriques parfaits et échangeurs thermiques	1 ^{re} /T	2
Actionneurs et modulateurs : moteurs électriques et modulateurs, vérins pneumatiques et interfaces, vannes pilotées dans l'habitat pour des applications hydrauliques et thermiques				1 ^{re} /T	3	
Accouplements permanents ou non, freins				1 ^{re} /T	2	
Convertisseurs d'énergie : ventilateurs, pompes, compresseurs, moteur thermique				1 ^{re} /T	2	
Éclairage				1 ^{re} /T	2	
3.2.2 Stockage d'énergie				3.2.2 Stockage d'énergie		
Mécanique, hydraulique ou pneumatique : sous forme potentielle et/ou cinétique	*	1 ^{re} /T	2	Mécanique, hydraulique ou pneumatique : sous forme potentielle et/ou cinétique	*	1 ^{re} /T
Chimique : piles et accumulateurs, combustibles, carburants, comburants	*	1 ^{re} /T	2	Chimique : piles et accumulateurs, combustibles, carburants, comburants	*	1 ^{re} /T
Électrostatique : condensateur et super condensateur	*	1 ^{re} /T	2	Électrostatique : condensateur et super condensateur	*	1 ^{re} /T
Électromagnétique	*	1 ^{re} /T	2	Électromagnétique	*	1 ^{re} /T
Thermique : chaleur latente et chaleur sensible	*	1 ^{re} /T	2	Thermique : chaleur latente et chaleur sensible	*	1 ^{re} /T

Lien avec le programme de physique

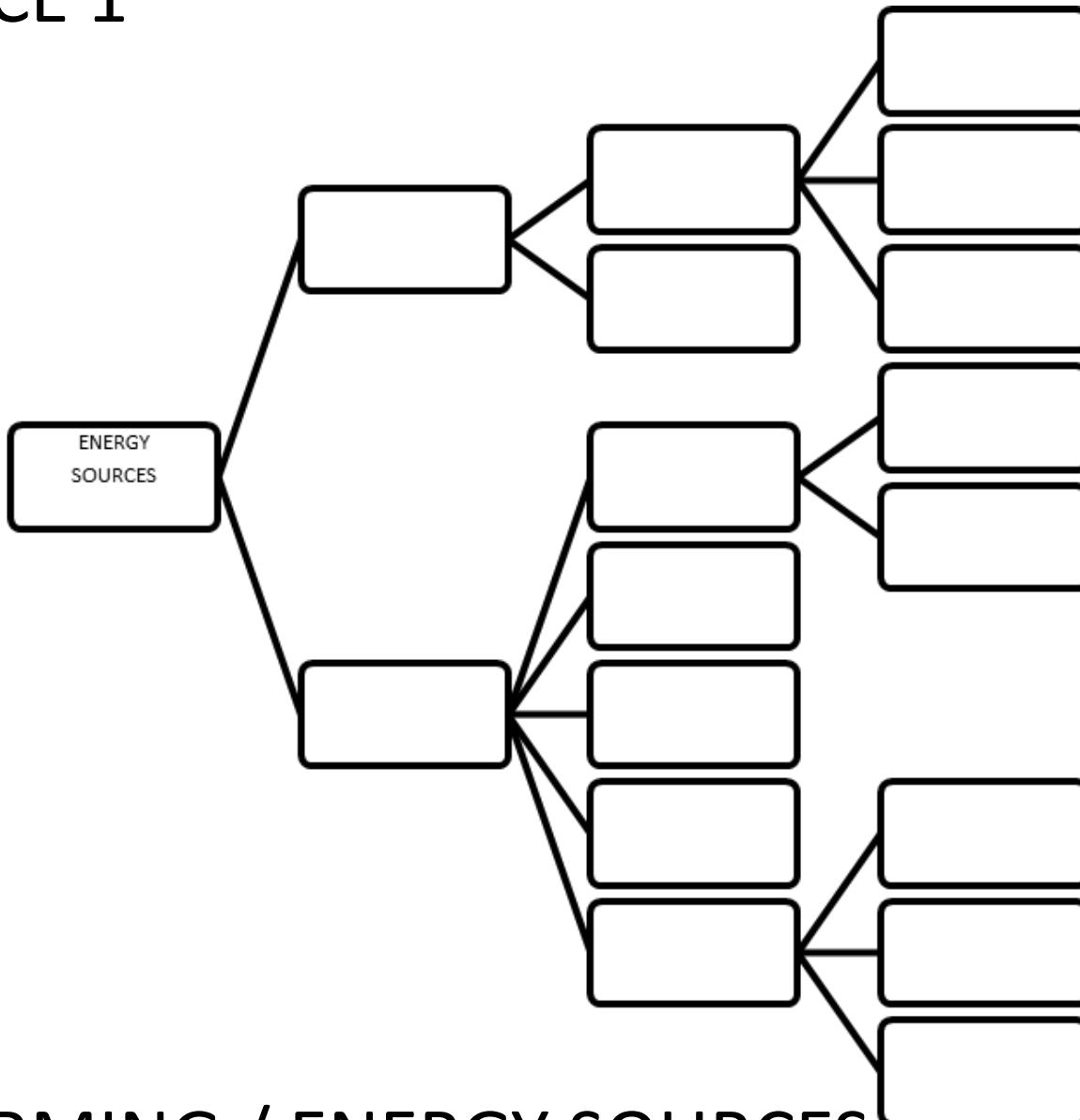
Critères pertinents du stockage par énergie potentielle
Énergie ; puissance. / Conservation de l'énergie.

COURS ANGLAIS: 'ENERGY AND OUR LIVES'

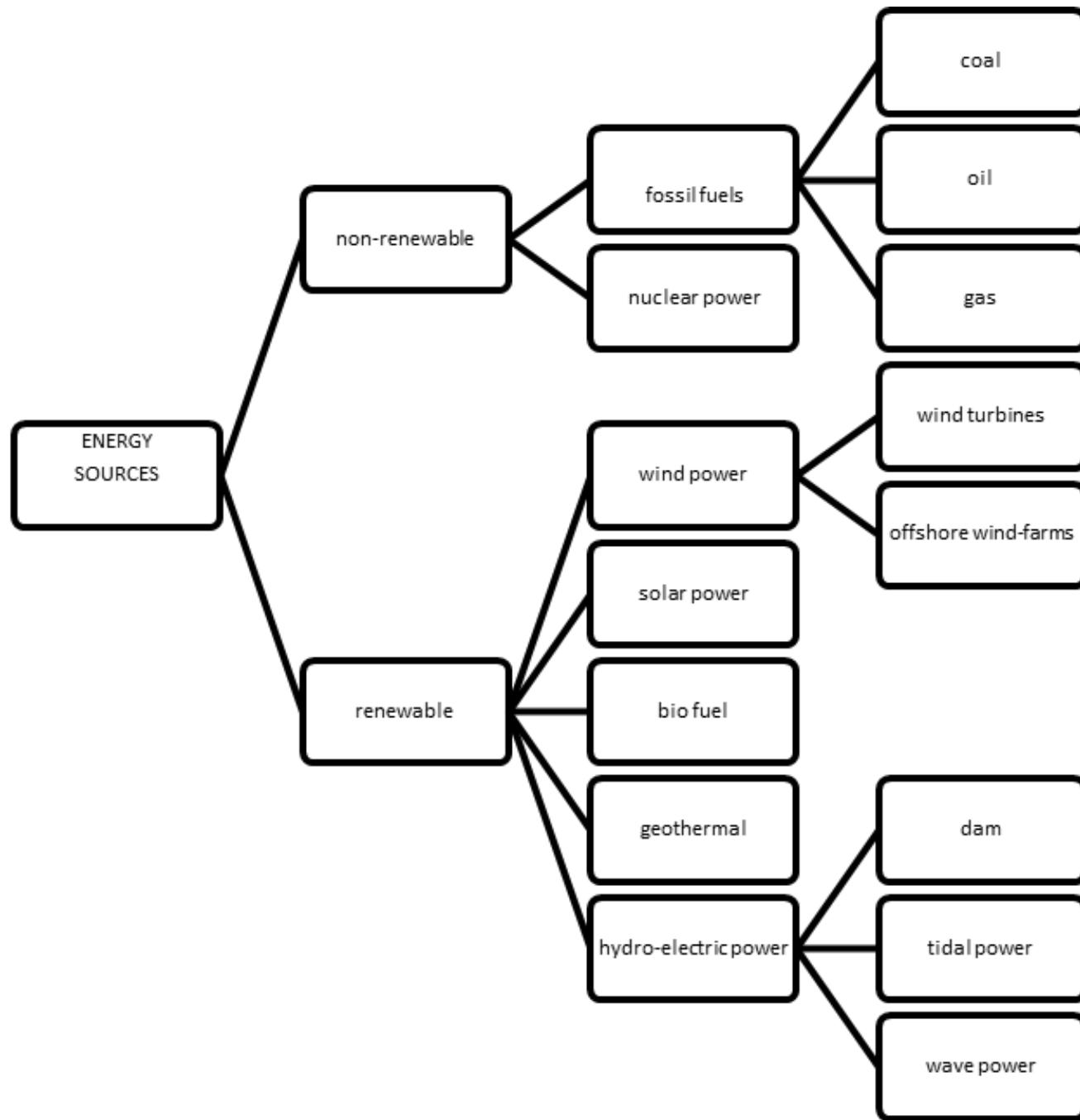
SEANCE 1



STI2D
LV #1
LV #2
STI2D LV # 1
LV #3
LV #4
STI2D LV # 2
LV #5
LV #6



BRAINSTORMING / ENERGY SOURCES



STI2D
LV #1
LV #2
STI2D LV # 1
LV #3
LV #4
STI2D LV # 2
LV #5
LV #6

Séance 1

PREPARATION D'EXPOSES sur centrales nucléaires, hydrauliques et éoliennes

- Photo
- Schéma
- Différentes parties
- Fonctionnement
- Avantages
- Inconvénients
- (recherche internet cadrée)(site pré-défini)

STI2D	
LV #1	
LV #2	
STI2D	
LV # 1	
LV #3	
LV #4	
STI2D	
LV # 2	
LV #5	
LV #6	

SEANCE 2



- EXPOSES
- Prise de notes et restitution par les autres groupes
- Comparaison entre modes de production d'énergie
- (Comparatifs , superlatifs)

STI2D
LV #1
LV #2
STI2D LV # 1
LV #3
LV #4
STI2D LV # 2
LV #5
LV #6

ENERGY SOURCES	ADJECTIVES
solar power	safe
hydro-electric power	renewable
wind power	eco-friendly
fossil fuels	cost-effective
nuclear power	polluting
biomass	easy to exploit
geothermal power	etc...

Séance 2

- VIDEO : Dinorwig
« How they do it »



- La centrale de Dinorwig



- Le phénomène du ‘TV pickup’



COURS CO-ENSEIGNEMENT

SEANCE 1



Activité 1: Appropriation du problème.

Structure : groupes de 3 élèves, 1 ordinateur par groupe

Professeur STI2D et professeur d'anglais : en ressource mobile

Task 1: How does a pumped storage power plant work ?

Task 2: What's the use of a pumped storage power plant ?

Etre capable d'exprimer l'utilité de l'installation . Vérification orale itinérante .

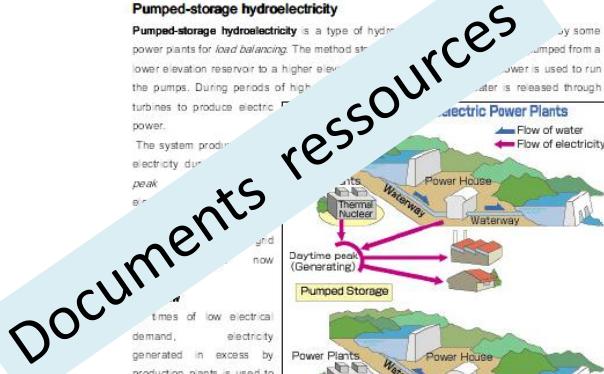
STI2D
LV #1
LV #2
STI2D LV #1
LV #3
LV #4
STI2D LV #2
LV #5
LV #6

activités TPWorks

The screenshot shows a computer screen displaying the TPWorks software. The main window is titled "PUMPED STORAGE HYDROELECTRICITY". It features a central diagram of a pumped storage power plant with labels for "open basin", "closed basin", "pump-turbine", "generator", and "pump storage". Below the diagram are three large icons: "Installations" (a water wheel), "Documents" (a book), and "Activities" (a person working). To the left, there is a sidebar with a "Case study" section containing a British flag icon and the text "Case study". Below this are sections for "Ressources" (including "Glossary", "Solidworks Models", "Squeeze lamp - document", "Clockwork torch - documents", "Handcrank + battery - documents", and "Obtaining a signal on the oscilloscope") and "Technical domains" (including "Infrastructures and energy" with an Eiffel Tower icon, "Matter - Energy - Information" with a lightning bolt icon, and "TEAMWORK" with a team icon). A timer in the bottom left corner shows "04:00". A blue banner across the bottom of the window reads "Envoyer un message". The overall interface is designed for educational purposes, specifically for learning about hydroelectric power generation.

COURS CO-ENSEIGNEMENT

SEANCE 1

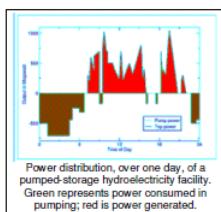


During times of low electrical demand, electricity generated in excess by production plants is used to pump water into the higher reservoir. When there is higher electrical demand, water is released back into the lower reservoir through a turbine, generating electricity. Reversible turbine/generator assemblies act as pump and turbine (usually a Francis turbine design). The system uses the height difference between two natural or artificial reservoirs.

Taking into account evaporation losses from the exposed water surface and conversion losses, approximately 70% to 85% of the electrical energy used to pump the water into the elevated reservoir can be regained. The technique is currently the most cost-effective means of storing

large amounts of electrical energy, but capital costs and the presence of appropriate geography are critical decision factors.

The relatively low energy density of pumped storage systems requires either a very large body of water or a large variation in height. For example, 1000 kilograms of water (1 cubic meter) at the top of a 100 meter tower has a potential energy of about 0.272 kWh. The only way to store a significant amount of energy is by having a large body of water located on a hill relatively near, but as high as possible above, a second body of water. In some places this occurs naturally, in others one or both bodies of water have been man-made.

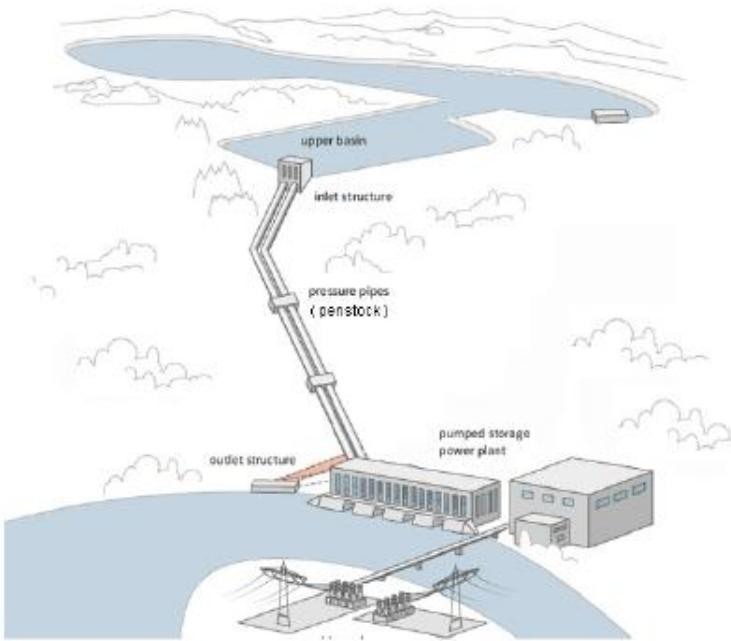


This system may be economical because it flattens out load variations on the power grid, permitting thermal power stations such as coal-fired plants and nuclear power plants and renewable energy power plants that provide base-load electricity to continue operating at best efficiency, while reducing the need for "peaking" power.

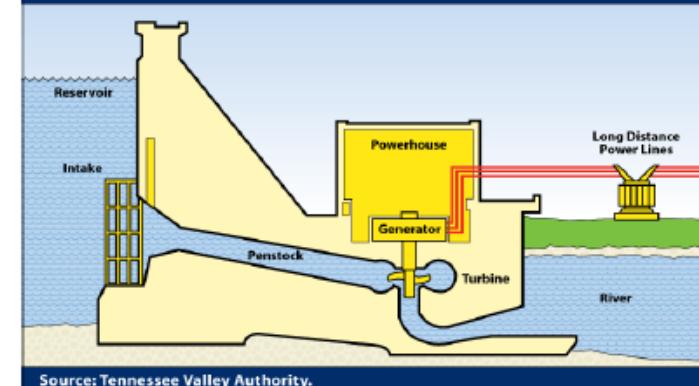
Along with energy management, pumped storage systems help control the electrical network and provide reserve generation. Thermal plants are much less able to respond to sudden changes in electrical demand, potentially causing frequency and voltage instability.

Another use for pumped storage is to level the fluctuating output of intermittent power sources such as wind or solar power plants. It is likely that pumped storage will become especially important as a balance for very large scale photovoltaic generation.

From Wikipedia, the free encyclopedia



Schematic of a Hydroelectric Dam



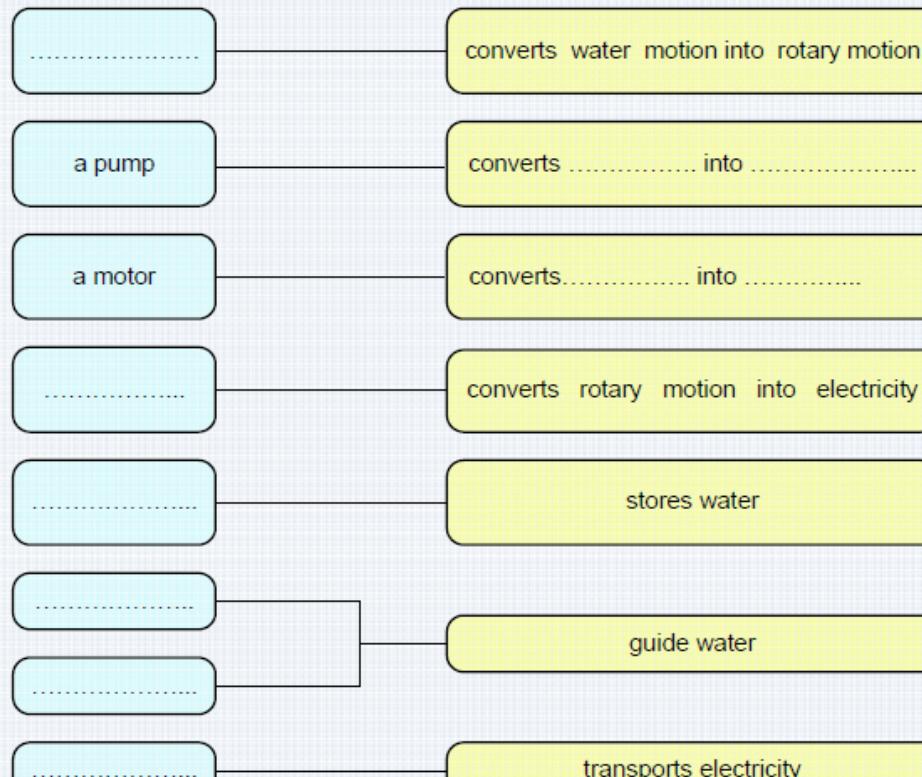
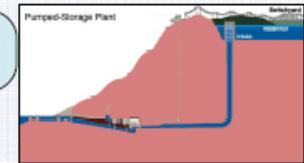
Source: Tennessee Valley Authority.

COURS CO-ENSEIGNEMENT

SEANCE 1

Document à compléter

Store and retrieve energy : pumped storage hydroelectric system



Choose terms from the list below :

a generator ; a penstock ; an electric line ; a turbine
a pump ; an alternator ; a motor ; a pipe ; a reservoir

Choose terms from the list below :

electricity ; rotary motion ; water motion

COURS CO-ENSEIGNEMENT

SEANCE 1 (SUITE)



Activité 2 : Application à un cas particulier

Structure : 10 groupes de 3 élèves, organisés en 2 x 5 groupes

Professeurs : en ressource mobile

5 descriptifs d'installations



Extraire les informations pertinentes, compléter le tableau récapitulatif

Sélectionner deux paramètres significatifs (justifier)

Confrontation et harmonisation des critères et valeurs choisis

Créer un graphique sommatif (cobweb chart sur ordinateur) *

Préparer une présentation structurée de la centrale
(illustrations fournies : 1 carte , 1 photo pour chaque centrale)

STI2D
LV #1
LV #2
STI2D LV # 1
LV #3
LV #4
STI2D LV # 2
LV #5
LV #6

COURS CO-ENSEIGNEMENT SEANCE 1 (SUITE)

5 centres de pompage turbinage  *5 x 2 groupes de 3 élèves*

Bath County Pumped Storage Station

Cradled in Virginia's rugged Allegheny Mountains, the world's most powerful pumped storage generating station quietly balances the electricity needs of millions of homes and businesses across six states.

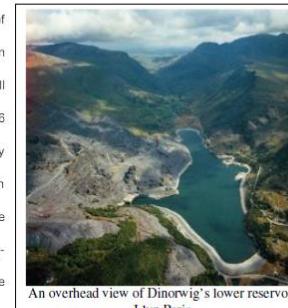
The Bath County Pumped Storage Station, which went into operation in 1985, is jointly owned by Dominion and the operating companies of the Allegheny Power System. Generation. This mammoth station was cited as one of the top engineering achievements. The earth and other project facilities, if piled up,



1,000 feet (305 m) high. Enough concrete was poured to build 200 miles (322 km) of highway.

Pumped storage hydroelectric power – Dinorwig Power Station, North Wales

Dinorwig Power Station, located adjacent to the Snowdonia National Park in Gwynedd, North Wales, is Europe's largest pumped storage hydroelectric power station. It is also one of the fastest, most dynamic power plants in the world, capable of delivering its full station output of 1800 MW in only 16 seconds. This rapid response is strategically important to the GB electricity system in helping National Grid maintain the balance of supply and demand on a second-by-second basis across the network. The system enables 9100 MWh of energy to be stored in the reservoirs.



An overhead view of Dinorwig's lower reservoir, Llyn Peris.

Documents ressources

Visitor Center
Open daily except major holidays
9:00 a.m. to 5:00 p.m.

Raccoon Mountain

TVA is proud of Raccoon Mountain Pumped Storage Plant and the benefits it provides to local and regional residents. Enjoy your visit, and thank you for taking the time to learn more about TVA power plants. If you have additional questions, please see a Visitor Center staff member. Also visit www.tva.com for further information about the Tennessee Valley Authority, including annual and environmental reports, events, history, and facilities.

For alternate formats of this document, call 865-632-8824 and allow five working days for processing.
www.tva.com



Taum Sauk Hydroelectric Power Station

The Taum Sauk pumped storage plant is located in the St. Francois mountain region of the Missouri Ozarks approximately 90 miles (140 km) south of St. Louis near Lesterville, Missouri in Reynolds County. The pumped-storage hydroelectric plant, operated by the AmerenUE electric company, was designed to help meet peak power demands during the day. In periods of high electric demand, electrical generators are turned by water flowing from a reservoir on top of Proffit Mountain into a lower reservoir on the East Fork of the Black River. The generators and turbines at river level are reversible, and at night the excess electricity available on the power grid is used to pump water back to the mountaintop.

The Taum Sauk plant is notable in that it is a pure pump-back operation – there is no natural primary flow available for generation, unlike most other pumped storage sites. It was among the largest such projects when it was built. Construction of the Taum Sauk plant began in 1960 and operation began in 1963. The two reversible pump-turbine units are each capable of generating 225 megawatts of power for



The two generators are each capable of producing up to 225 MW of power.

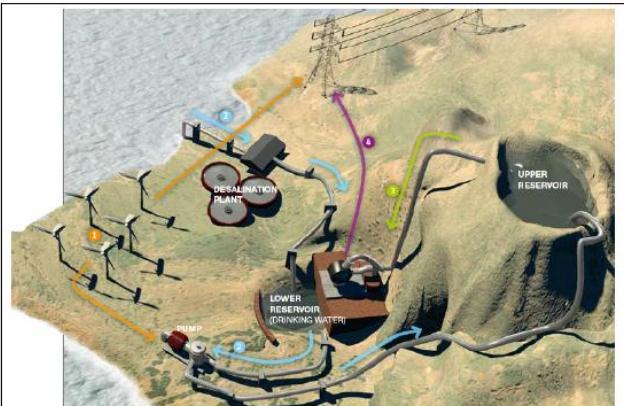
How El Hierro will achieve full energy self-sufficiency

① El Hierro's wind-powered, pumped hydro storage system will rely on five windmills to supply electricity to the island's 11,000 residents.

② At night, when winds are high and demand for electricity is low, water will be drawn from the sea through three desalination plants into a holding reservoir. The windmills then power a pump that drives the water uphill for over half a kilometer to a naturally formed volcanic crater two hundred times the capacity of an Olympic swimming pool.

③ If the windmills can't meet the energy demand during the day, the tap to the upper reservoir is opened. The water flows downhill through a turbine, releasing its energy – a total power capacity of 11.3 MW.

④ The water will generate enough electricity to keep the island running for around two days without wind. The two reservoirs also provide enough drinking water for the island's inhabitants to irrigate their crops and meet the demands of the growing number of tourists.



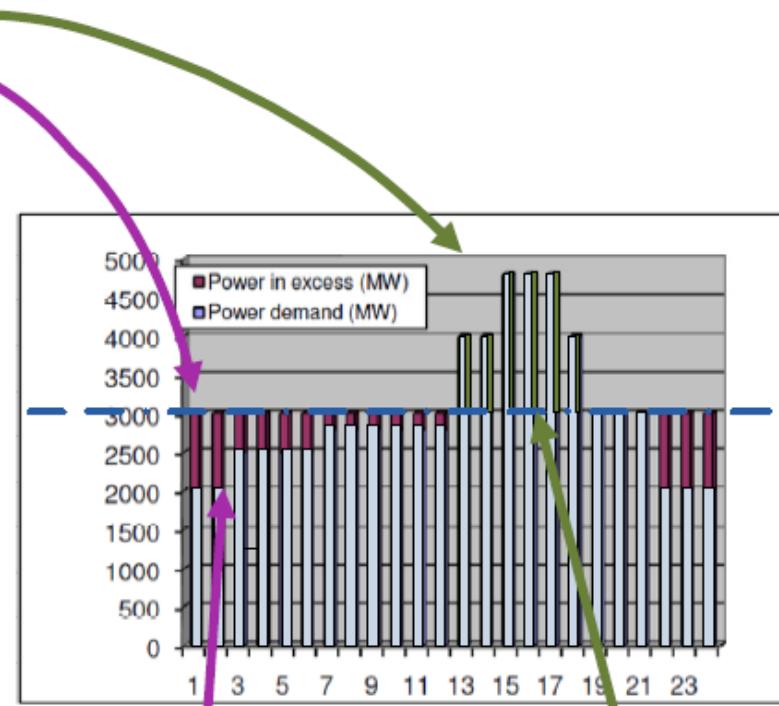
Water stored in the upper reservoir is used for hydroelectric generation during times of peak

Problématique projetée en plein écran

Is your Pumped Storage Power Plant able to cope with peaks and off-peaks in a city such as Los Angeles ?

hour of day	Total power demand (MW)	Available Power (MW)	"Peaking" power (MW)
1	2000	1000	0
2	2000	1000	0
3	2500	500	0
4	2500	500	0
5	2500	500	0
6	2500	500	0
7	2800	200	0
8	2800	200	0
9	2800	200	0
10	2800	200	0
11	2800	200	0
12	2800	200	0
13	4000	0	1000
14	4000	0	1000
15	4800	0	1800
16	4800	0	1800
17	4800	0	1800
18	4000	0	1000
19	3000	0	0
20	3000	0	0
21	3000	0	0
22	2000	1000	0
23	2000	1000	0
24	2000	1000	0

Totalized energy consumed in one day : 72,000 MWh

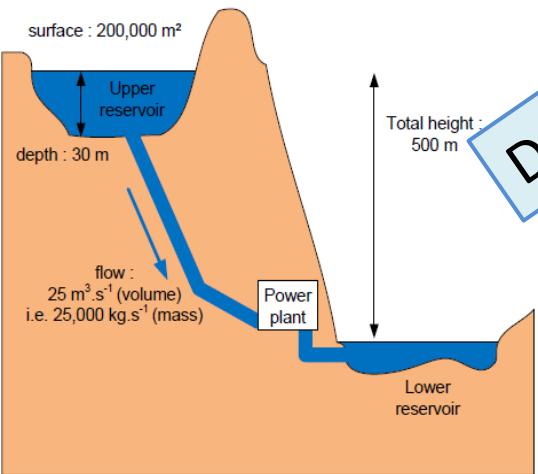


Totalized available energy (off peaks): 8350 MWh

Totalized « peaking » energy : 8350 MWh

Documents d'appui

Pumped storage : a numerical example



1. Store water : $\text{Surface} \times \text{Depth} = 200,000 \times 30 = 6 \times 10^6 \text{ m}^3$
 2. Mass : $6 \times 10^6 \text{ m}^3 \times 1000 \text{ kg} \cdot \text{m}^{-3} = 6 \times 10^9 \text{ kilograms}$

3. Stored energy : mass x gravity x height
 $6 \times 10^9 \times 9.81 \times 500 = 2.94 \times 10^{13} \text{ Joules}$
 $2.94 \times 10^{13} \text{ Joules} = 8.2 \text{ GWh}$
4. Maximum power : mass flow x gravity x height
 $25 \times 10^3 \times 9.81 \times 500 = 123 \text{ Megawatts}$
5. Autonomy : stored energy / Power
 $8.2 \times 10^9 / 123 \times 10^6 = 6.7 \text{ hours}$

1 litre of water $\Leftrightarrow 1 \text{ kg}$

1 ton of water $\Leftrightarrow 1,000 \text{ kg}$

1 kWh = 3,600,000 Joules

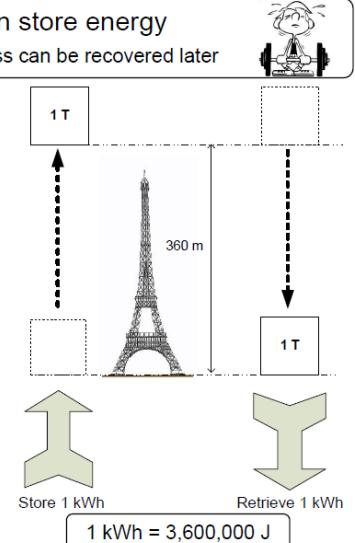
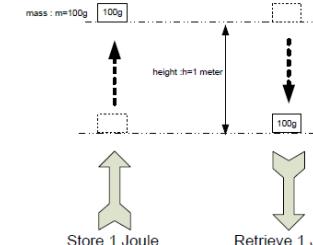
Gravity : $g = 9.81 \text{ units}$

1. Store water : $\text{Surface} \times \text{Depth} = 200,000 \times 30 = 6 \times 10^6 \text{ m}^3$
 2. Mass : $6 \times 10^6 \text{ m}^3 \times 1000 \text{ kg} \cdot \text{m}^{-3} = 6 \times 10^9 \text{ kilograms}$

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 $6 \times 10^9 \times 9.81 \times 500 = 2.94 \times 10^{13} \text{ Joules}$
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4. Maximum power : mass flow x gravity x height
 $25 \times 10^3 \times 9.81 \times 500 = 123 \text{ Megawatts}$
5. Autonomy : stored energy / Power
 $8.2 \times 10^9 / 123 \times 10^6 = 6.7 \text{ hours}$

Lifting a mass can store energy
 The energy used to lift a mass can be recovered later

Energy (in Joules) :
 $E = m \times g \times h$



m : mass in kg
 g : gravity, 9.81 m/s^2 , rounded off to 10 m/s^2
 h : height in meters

+ TOOLBOX : « LA LANGUE DU DEBAT »



COURS CO-ENSEIGNEMENT SEANCE 1 (SUITE)

Document à compléter par chaque groupe

	Total generation power (MW)	Maximum flow ($\text{m}^3.\text{s}^{-1}$)	Height (m) (<i>hydraulic head</i>)	Energy capacity (GWh)	Number of turbines
Dinorwig G1					
Taum Sauk G2					
El Hierro G3					
Bath County G4					
Raccoon Mountain G 5					

STI2D
LV #1
LV #2
STI2D LV # 1
LV #3
LV #4
STI2D LV # 2
LV #5
LV #6

1 US gallon = 3.78541178 litre

1 foot = 0.3048 metre

1 acre = 4 046 m²

	Total generation power (MW)	Maximum flow ($\text{m}^3.\text{s}^{-1}$)	Height (m) (<i>hydraulic head</i>)	Storable energy (GWh)	Number of turbines
Dinorwig G1	1,800 MW		530 m	9.100 GWh	6
Taum Sauk G2	450 MW		240 m 800 feet	3.45 GWh	2
El Hierro G3	12,5 MW		700 m	1 GWh	
Bath County G4	3,000 MW	850 cubic m/sec	380 m	35 GWh	6
Raccoon Mountain G 5	1,600 MW		990 m	35 GWh	4

CORRIGE

SEANCE 3



- VIDEO TRAILER : The Dinorwig Slate Quarry



- Récapitulatif chronologique de la carrière



STI2D
LV #1
LV #2
STI2D LV # 1
LV #3
LV #4
STI2D LV # 2
LV #5
LV #6

- Opposition passé / présent (*used to, didn't use to*)
(comparaison des conditions de travail)



Vision diachronique du progrès

SEANCE 4



- Texte TV Pickup

STI2D
LV #1
LV #2
STI2D LV # 1
LV #3
LV #4
STI2D LV # 2
LV #5
LV #6

TV pickup

From Wikipedia, the free encyclopedia

TV pickup is caused partly by the simultaneous mass use of [electric kettles](#)

Television pickup is a phenomenon affecting the [British National Grid](#) electricity transmission network. As the British public tend to watch the same [TV](#) programmes and take advantage of breaks in these programmes to operate electrical appliances (particularly kettles) they cause large, synchronised surges in electricity consumption. National Grid staff devote considerable resources to predicting and providing electricity supply for these events which typically impose an extra demand of around 200-400 [megawatts](#) (MW) on the Grid. Short term supply tends to be found from [pumped storage reservoirs](#), which can be quickly brought online, backed up by the slower fossil fuel and nuclear power stations. The largest ever pickup was on 4 July 1990 when a 2800MW demand was imposed by the ending of the [penalty shootout](#) in the [England v West Germany FIFA World Cup semi-final](#).^{[1][2]} In addition to pickups the Grid also prepares for synchronised switch-offs during remembrance and energy awareness events



Cause

TV pickups occur during [breaks](#) in popular television programmes and are a surge in demand caused by the boiling of [kettles](#) and the opening of fridge doors by millions of people.^[2] The phenomenon is particularly pronounced in the UK as the British people, more than any other, traditionally watch the same television programmes.^[4] The introduction of a wider range of TV channels is mitigating the effect but it remains a large concern for the National Grid operators.^[5] There are typically several large peaks in energy use caused by TV pickup during each day dependant on TV schedules, the day of the week and weather.^[4] The largest pickup of the day is usually at 21.00 when several popular TV programmes end or go to commercial breaks.^[4] The most popular programmes, hence those giving the greatest pickup are [soaps](#), sporting events, [reality tv](#) and [royal weddings](#).^{[1][3]} A typical TV pickup imposes an extra demand of 2-400 [megawatts](#) with larger soap storylines bringing around 7-800 MW.^[1]

- Habitudes des britanniques ([are used to , usually](#))

COURS CO-ENSEIGNEMENT

SEANCE 2



Activité 3 : *Mise en commun*

Résolution problématique

Structure : 2 demi-classes

Professeurs : *supervisent et régulent les échanges*

- **Présentation en groupe du travail réalisé à l'activité 2**
5 groupes de 3 5 exposés de 5 mn + 3 mn de questions = 40mn

- **Résultat attendu** : dire si les contraintes sont satisfaites
« our plant is called ... » « is located ... »
« the production capability of our plant is ... »
- **Tâches des groupes auditeurs :**
Noter les informations transmises par les orateurs (objectif : valorisation différentielle)

STI2D
LV #1
LV #2
STI2D LV # 1
LV #3
LV #4
STI2D LV # 2
LV #5
LV #6

COURS CO-ENSEIGNEMENT

SEANCE 2



Activité 4 : Valorisation

Structure : 2 demi-classes

Permutation activités après 40 mn

4.1 Production orale avec l'assistante

Structure : demi-classe soit 5 groupes = 15 élèves

Professeur d'anglais :

évalue la prise de parole par grille critériée

STI2D
LV #1
LV #2
STI2D
LV # 1
LV #3
LV #4
STI2D
LV # 2
LV #5
LV #6

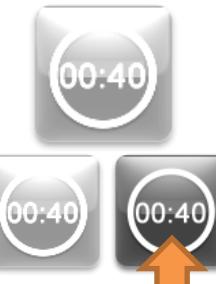
Task: « Vendre » votre centre de stockage à l'assistante ('investor') au cours d'une table ronde ; 15 élèves face à l'assistante

Utilisation de comparaisons numériques (STI)

Utilisation de comparaisons et superlatifs(LV)

COURS CO-ENSEIGNEMENT

SEANCE 2



Activité 4 : Valorisation

Structure : 2 demi-classes

Permutation activités après 40 mn

4.2 Production écrite par groupes de 3

Structure : demi-classe soit 5 groupes = 15 élèves

Professeur de STI2D : *aide à la rédaction*

STI2D
LV #1
LV #2
STI2D LV # 1
LV #3
LV #4
STI2D LV # 2
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LV #6

Task : Communiquer par écrit avec un investisseur : rédiger un courrier électronique de valorisation et une fiche technique récapitulative (publicité comparative admise) .

+ ***Toolbox « emailing »***

Le travail écrit est ramassé et évalué à la fin de la séance par les 2 professeurs.

SEANCE 5



- TÂCHE FINALE

TRAVAIL EN GROUPES AU CDI

How does a pumped storage plant work?

Water is pumped from the lower reservoir to the upper one during periods of low demand. It's stored there until needed, and then water is pulled from the reservoir and into a large concrete pipe that leads almost 1,000 feet down inside the mountain. The flow of water spins the turbines, which rotate a shaft inside an electromagnetic coil, producing electricity. When power generation isn't needed, the turbines operate in reverse, pumping water back up into the upper reservoir.

Raccoon Mountain

The water drops 990 feet

from the upper reservoir at Raccoon Mountain Pumped Storage Plant to the turbines deep inside the mountain. After the water is used to generate electricity, it is discharged into the lower reservoir.

TVA

Visitor Center
Open daily except major holidays
8:00 a.m. to 6:00 p.m.

TVA is proud of Raccoon Mountain Pumped Storage Plant and the benefits it provides to local and regional residents. Enjoy your visit, and then you can stop by to learn more about TVA power plants. If you have additional questions, please see a Visitor Center staff member. Also visit www.tva.com for further information about the Tennessee Valley Authority, including annual and environmental reports, events, history, and features.

For accurate copies of this document, call 865-632-6801 and allow five working days for processing. www.tva.com

Upper dam height 230 feet
Upper dam length 6,200 feet
Power capacity 4 units supplying 1,552 megawatts
Upper reservoir length 1.2 miles
Built 1970-78

Floodgate, or gate, that carries water from upper reservoir to turbines

Generator Room at Raccoon Mountain

Fishing
Pavilion
Visitor Center
Picnic Area
Overlook
Raccoon
Boat Launch

Visitor Center

Upper dam height 230 feet
Upper dam length 6,200 feet
Power capacity 4 units supplying 1,552 megawatts
Upper reservoir length 1.2 miles
Built 1970-78

CREATION D'UNE BROCHURE TOURISTIQUE SUR LA CENTRALE ET SON ENVIRONNEMENT CULTUREL

- Réinvestissement contextualisé des connaissances technologiques
- Elaboration d'un historique du lieu
- Ouverture sur l'aspect touristique et culturel
- Travail sur la forme spécifique de la brochure

STI2D
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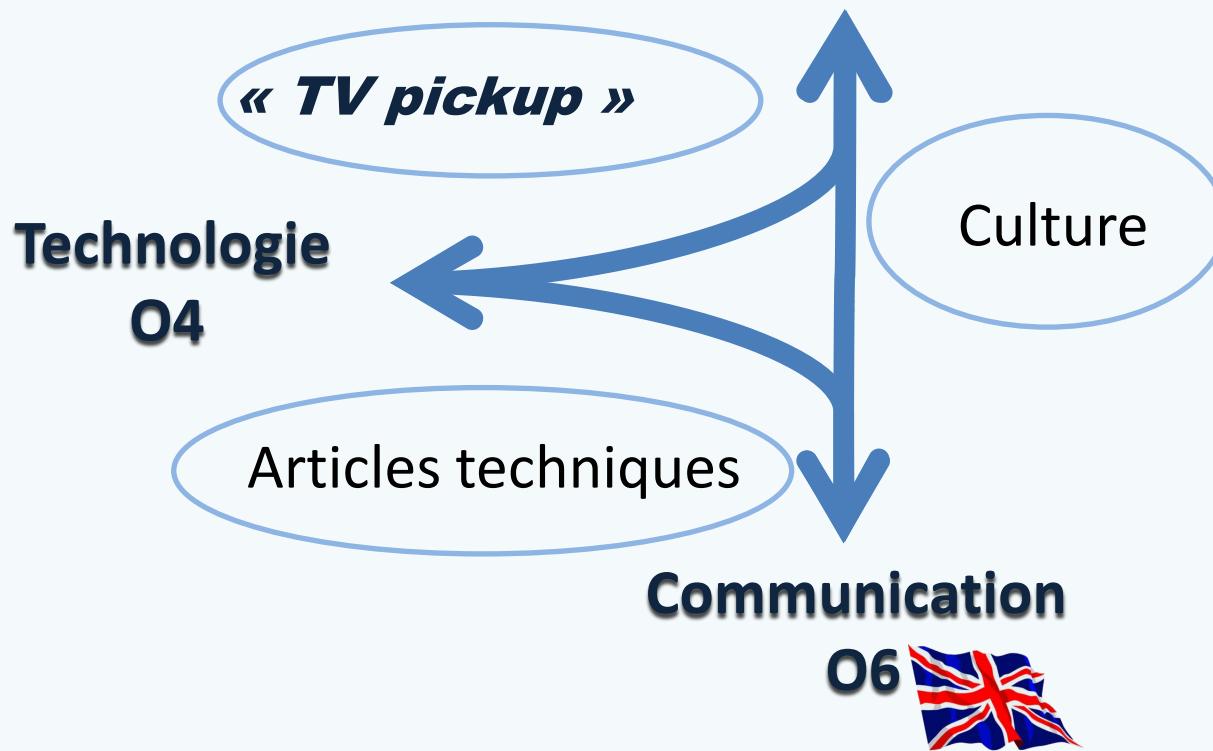
SEANCE 6

- Evaluation finale
- Ecrire un article de presse de type informatif sur leur centrale et son environnement touristique et culturel
- 200 mots
- Comparaison - habitude - passé/présent

STI2D
LV #1
LV #2
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LV #3
LV #4
STI2D LV # 2
LV #5
LV #6

CONCLUSION

Société et développement durable O1



Humaniser la relation à la technique par la dimension culturelle LV

Alternance des approches cognitives STI2D/ langue vivante

