静音字幕倍速超清5.10.mp401:45:0000:00:00播放视频超级会员高速播放通道 立即开通5.10.mp4视频AI看课件文稿 选集01:32:304.23.mp4未观看01:34:434.25.mp4未观看01:35:104.26.mp4未观看01:33:334.28.mp4未观看00:42:114.30上.mp4未观看00:44:274.30下.mp4未观看01:45:485.10.mp4正在播放01:49:255.11.mp4观看至38%01:39:255.14.mp4未观看01:44:475.16.mp4未观看01:41:425.17.mp4未观看01:43:005.23.mp4未观看01:41:035.24.mp4未观看01:44:595.28.mp4未观看01:36:275.30.mp4未观看01:37:285.31.mp4未观看01:42:095.7.mp4未观看01:36:175.9.mp4未观看01:31:546.11.mp4未观看01:26:256.13.mp4未观看01:34:576.14.mp4未观看01:36:466.4.mp4未观看01:35:516.6.mp4未观看01:29:346.7.mp4未观看喂喂。at.嗯。来那个的话，好开始。嗯。打工。对。啊啊，那用你的也行，你一样一样。啊好好好，你你装兜里，别忘了那个带回去。我呃。大二的那个他没拿走。我说哦，谢谢你。然后呢啊？第四。明白吗？先走了。诶。你拿。good.欢迎三二大号。呃，your voice is mute。你我的，你看你的。嗯。啊，是我老是卖这个东西啊，谁的名字他的是吧？我跟他说了，我说他的静音了，他听。专利不发呃。I'm make a phone by ours.OK,good,good,not my direction.呃，也就是呃miss week。ya we are missing wis wis wis mis wa yuh I,but I think she will join at a very short time.so that's not a big problem.OK.啊。so what i can do right now is start with the presentation,but of course without.translation into Chinese up.OK I tried one moment it did sometimes confusing.嗯up。oc quet now,what we did in the in the last uh presentation or last uh lesson?was talking more about a different aspects in general,and then we started with green buildings.and the green building is um something very important nowadays in Germany all the time to think how buildings when they are built.are green buildings or are buildings which are relevant in terms of energy consumption or a reduction?this is because in Germany we have a lot of trouble with the so called sioux two emission SEM.er,you know that germany's er per capita,per per head count,one of the big er seal,two emissions er countries.not in total,because Germany is small,but er per head count the the eo to missions are extremely high.are very much higher than,for instance,the headcount of a Chinese citizen.um,and so we are forced to our fraction. of course,fraction of of head counts er to reduce and to do more.and the building site is for the co two emissions,a very high percentage. it's round about forty percent.there is only one er SEC tar besides the building which I sum more pollutant this or also very high pollutant. this is traffic.so for traffic,we have also not been able to reduce the co two emissions.now for the traffic,it is a quite em how to say it is quite em.嗯嗯。there are other factors,but building has a special factor and a building has a factor that once a building is built.it is er existing for for long time I have had here a slide.at first on a slide i checked this one. here we see that the building structures have durations,eventually of of.thirty forty years,although we can do something with EX,with EX pension.but even if we do with expansion or with equipment,this is twenty years,thirty years.so the building sector is extremely important and therefore the planning has to consider the green building.or has to develop ideas how in early stages um when the building is erected?er savings can already be done.嗯。and there exists on the legal side some um,some regulations,some ordinances.and so in Germany,we are of always ordinances for doing this,so as we have an energy saving ordinance.and another ordinance,the socalled ee electric electric energy ordinance.and they are part of this building law that exists more laws for the buildings. and so there are standards.eh building regulation standards and to a to establish efficient buildings reduce their energy consumption and promote the use of renewable energies.so in these ordinances,all these points have been addressed and er.then of course,there have been set up goals for that. I think that they are up to twenty thirty.there exists a clear plain,so it was set up twenty fourteen and it is now continuously.eh eh,there are the regulations valid until twenty thirty. I think,and there are clear.a clear gold's stepwise set up and that one is the twenty four percent lower deviation of energy found to er.of two thousand fourteen so two thousand fourteen is a level which was definitely defined as railroads as reference.and from this on,the twenty five percent a goal was set up and the goal was moderate to a certain extent.but because it is so difficult to.to change buildings,especially old buildings cannot be made very energy efficient.they are have old structures,they have not good isolation. so that's,that's one of the challengers,so this er.em this ordinance is therefore only for new buildings,but the new buildings have to comply directly with all these requirements with shape.with the envelope,the technical equipment also use of renewable energy. this is all everything is here.e valid for new buildings.and of course,a environmental frantic building materials have to be used.this means that there is a concrete which is used for building the buildings.has to be environmental friendly,but also all the coverage dealing for the let's say dealing for the.um um um making sure that he doesn't go away,so it's,it's dm ing at in principled ming at the fine.should be also an environment used frankly.because we have a lot of old buildings which have a material which is even dangerous for the people,because there are um as best asbestos,i don't know it's english asbestos.but asbestos is a is a small fibre which when there is in the dust,it goes into the lung.and it can generate cancer. so there when all the buildings have a lot of this type of.em materials in sight because they were.said that they are good deming materials,but on the other side they are really dangerous.because of their of their cancer,let's say closeness to to create cancer. yeah,therefore,we have to the these materials have been forbidden.and they are not allowed anymore to be used now for the household. it is quite clear,but in the factories also there is not,it is not allowed.that to use these materials anymore,and we have renewable energies and waste reduction which has to be a significant.element of of this.umi,yes,what,what we will do I will do is explain some examples. May be another point is um.you cannot claim to build a building which is good. you have to prove it,and there exists some organizations like LED or prim or h qa or caspi a.they are organization is provide ss.er and the宪s are ur divided in tools，three levels，gold，silver and transit。gold is complying with all standards and very beautiful bro nz is complying with maybe the minimum standards.er,yeah,and they are awarded by these organizations. they exist more organizations they have set up their special test procedures to make sure that they.that this is then really also that this er,yeah,we comply with this er,but er in the end.t.it is according to the law and they check it and then they give the宪s according to the law because these companies are also competing and so even the distribution of宪s。is kind of competition.um,here in this building we cannot see really good,but what we can see is that em the complete heat distribution.is er is computed very thoroughly and er what we see is the arrows I try to.eventually,it's in German. I know,but eh,I tried to.right to stop the sharing.嗯，爱。ii would make it.bigger,so I'm glad to talk.嗯，搜过来一个noise。making this picture a little bit bigger.now I try to share again.yeah,so what do you see now here?is a building um the structure of a building and how the how the the air.um is er er er how the airer exchange happens in this building,what we see is they get fresh air.I will put it into.shake there is a.哎呀，服了我了。stick at the moment.宝贝，能不能？I hope you can see that em the arrow,i don't know how to change the arrow at the moment.um,and what we see is that on the right side here,there is fresh air and then going through the blue.let's say tube and this tube is already in earth so that the air gets a kind of warmth because it's already.er,let's a connect it to to the earth and i'll get earth. earth warmth already and then,of course,here is a second step.step where is an exchange between the let's a fresh air and the old air or the used air which is here seen as red?and this heat,so that we try to cool down the air,which is leaving the building there done.and on the other side,we are having here the blue one,which is the fresh air. and here we have an exchange of heat.so this means we are getting warmth into the air by the earth and by exchange from the.let's say used air.this is my son,umm,it does time. well,it's my ocean mask is out,please,yeah,i'll be here close,it's glad.t.好的，那这个教授也是进一步的，跟我们上一节课，其实已经给大家开过这个头，对吧？就是包括这个绿色建筑那呃这边呢啊嗯，教授再给大家大概详细的讲解一下啊，就包括它里面的。呃，有哪些的呃，我们这些绿色建筑，它有哪些的创新的地方啊，包括它的顶顶层的这些太阳能板也好，它的一些这个冷热的交换对吧，都合更合理的去利用。我的这个能源啊，包括它里面的布的一些，这个跟地热的一些交换等等的嗯。um,what we see as well is that there is a damming er er surface.and this has certain requirements,its zero point,fifteen vat per square meter calvin eh. this is a kind of regulation which defines minimum values.but we have the same with the WINDOWS. the WINDOWS are three glasses in one window.and also having a certain deming factor which is recorded and so when we look on to the buildings nowadays.they have kind of,let's say that the damming is one of the protection means. secondly,is using energy efficiently by using it through the air,through earth.er earther were warmth and exchanged warmth with the old older.好的，那我们这边它的创新的点有几个啊？一个就是说我们的整个建筑，它的这个密封性对吧啊？做的更好了，那就是让热能呢呃，不要散的太快啊。啊，那另外一个呢？就是说呃，我们的冷热交换的机制对吧？包括它的这个呃，它的整个的供暖，它不是像呃老式的，比如说烧煤啊，或者说是用这个电啊之类的它。它这边是用的地热的能源，然后呢呃，做这个冷空气和热空气的一个交换，然后呢，让室内呃，包括它的一个呃，新风的系统就是。让里面的呃新旧空气，包括冷热空气呃合理的去呃呃利用对吧，然后去合理的去叫呃这个呃应用我们的这个地热能源。让我们整个建筑呢，它能够是呃就是呃一个非常的节能环保的，这么一个建筑嗯。and an additional point is,this fresh air is has to be treated whence entering first,it is treated with a filter.e which is then taking out the.the pollution and secondly it is treated er probably in this area here where we have to put ED some moisture into or some a that hh ity because in winter time.the air is very cold,has no nearly no humanity and by heating it up it makes people ill in the it can make people ill in the.um in the buildings，那我们像我们现在这种新的建筑啊，它这个做的这个新风系统，那像我们外面的冷空气进来以后呢，在呃在呃前端呢，就会有呃。过滤网对吧把？就是像我们这个国内，特别是像北京这种的，对吧？雾霾天比较多的这种城市，那它就会先过呃，就是把这个空气里的杂质先滤掉，对吧？然后呢？进入我们建筑以后呢？在这个冷热。交换的这个地方呢呃，它有的时候比如说冬天的冷空气进来是非常干燥的，它这里呢也会做，不仅是一个加热，也会做一个。这个呃加湿，那让我们的这个室内的空气呢？呃能够不要这么干燥，因为我们之前也做过一个研究啊，就是呃如果说特别像冬天，为什么我们感冒的人这么多？就是因为你的空气，如果它的这个呃，就是我们的含水量啊，我们的这个湿度低于这20%还是多少的，就是它的就很容易引起。呃，呼吸道的一一系列的疾病，所以说呢，呃，它这边的整个的所谓的绿色建筑的呃，它里面是要考虑很多的，包括节能环保，对吧？对人体的健康，那包括哎，我里面这样子做了以后呢？我们。你们工作的工人呢？他可以更不要这么容易生病，对吧？那我这样子的话呢？呃，也也他们也可以少请点假，对不对？那这个是它这个绿色建筑要考虑到的方方面面的地方。and another point is a central system. so we have here one central point where the complete air CON air is treated.um and the heat is not er,it is not intended to have heating devices on all the levels.it is thought to have a central point because then the cost for a building can be reduced because otherwise all the people on the different levels would have to pay.and this is also then for the factory's a good point to have a central point which is distributing it to the factory.production area and to the offices嗯啊，那像我们这个呃珠海因为是没有这个呃集中供暖啊，就是像我们北方或像德国这边它一般的传统的供暖都是每家每户都会有一。一个呃加热的装置对吧？就是送到每户都会有一个这个呃加热片对吧？那像这种就如果是用的这个新的，这种新风的系统的话它。它就不需要再每家再加一个这种加热片，那它整个的就会呃通过呃我集中的这个供暖对吧，然后就传送到每一个呃屋子里面去。啊，那这样子呢，特别是在呃，像我们的厂房啊，或者说是办公的这种区域呢，就更方便。now,what are the design criteria for the total reduction of energy? first,it is the structure of the building,so it is more than just only the energy construction it conserved.or generation,it is already starting with the building where we have the WINDOWS with which are in a sense more vertical.er,the shape of the building which should be more er that of a less surface in order to allow heat not to.to to leave the building now.er with with with a lot of exposure areas er,so we have also another point is least least height between floors. this means floors should be.of course,our whole floor height should be according to a human factor,but when we look into factory buildings.and they are mostly very high,and we are heating a lot of useless air which is not reaching at the end the people.er and the glass front of administration buildings is directed to northeast.er north respectively east,so there north part is eris a part where er we have no sun.so there are some parts we should address them and consider,where is the sun? and so also heat retaining material s in the building.this means massive walls and ceilings. this means our walls are a little bit thicker and they are,they are when there is warm days.then they call they,they,they met. there's kind,they,they are kind of a memory of er of the warmth.and uh and protect protect principle,the people and a last comment on about the structure is.ten percent skylight so on the roof we have,we have WINDOWS and kind of WINDOWS.which allow Lndian ten percent of skylight entering into the buildings，嗯，好的，那我们呃，这个绿色建筑或者说我们从能源节省的这个角度来说啊，我们的呃。呃，整个的建筑呃，要符合哪些需求对吧？那我们从这个方面去考虑我们的factory planning那呃，从它的整体的构建，包括它的这个。呃，加热包括这个照明以及它的整个能源的供应的三个角度来展开，那第一个我们的structure of the building就是它的整个的这个建筑构造来说呢？它的呃，第一个呢就是我们的。啊，我们的整个的这个楼啊，希望它是一个比较紧凑的一个设计，因为你如果说是呃呃楼，它的结构不紧凑的话，它就有很多的。这个表面是会散热的，那我我这个希望它这个紧凑一些，那我的这个呃热量对吧？就不容易散掉，那包括呢，我们的整个的立面呃，它呢，希望是。呃，如果说有窗的话，对吧？呃，它的这个窗呢？最好是竖直朝床呃，那个垂直朝向的竖直方向的那呃，另外呢？呃，我们知道这个呃楼层的层高对吧？呃，一般来说，我们就是家用建筑，它有一个最低的层高，现在其实嗯，比老底子的这个层高其实都要低一点，对吧？我们有的老建筑，它的层高可能会到了。呃，四五米这样子对吧？但是现在你们如果去买商品房，一般也都是三米左右或是三米以下，那但是呢，工厂或者说办公区域呢，它传统的这种呃。层高都是很高的，那其实呢，就是也会造成了不必要的能源的散失，对吧？所以说呢呃，一般来说，如果我们只从节能的角度去看啊，那我们也是希望它的层高。呃，只要达到它的最低标准就可以了啊，另外呢，我们的这个呃，这个窗户啊，就是它的玻璃的朝向啊，就是呃，因为这个这个也是有的时候是避免那些光污染等等的，那它的。行政大楼的这个玻璃的朝向呢，一般就是嗯，它的规定呢是朝北朝东，这个方向就是一般，因为这个东和北它是没有太阳光的直射的。那另外呢？呃呃，房顶呢？需要有10%的这个天自然光，那这个呢？也是为了说节能，对吧？那我就是平常白天的时候，比如说你就呃不用呃，老是开灯了，对吧？那我就可以有自然。光的这个顶光的这个补充，另外呢？呃，需要这个建筑呢？能够去呃，用这个保温材料对吧？那特别是像呃大片的墙壁啊，或者是天花板啊之类的，那就是希望你这个建造的时候就可以用一些隔热的材料。now we come to this level of a heating air conditioned illumination.and here we see also kind of central.a central point,but we have here on cooling devices. we have a power supply.er,we have er worms which are getting from maybe computers er,so in the end we have an complete set of er.yeah,eh energy,which is either e her entering here,or we have er.the zeo.just have to check.er,the blue is the waterer,the blue blue is in principal water,i called it cold water. yeah,but in the end it's er.and here we have warm water,which is then specially for those which is er disposed we are with which then is.finally,er the delivering kind of the part of their warmth er and what we also see is er.嗯哦。来自网络问题。er bloc he cried saf ta,i don't know the english word,but it is in principle er energy consume energy producing.um啊啊device。because of.uh,taking advantage of uh.ero fer of ya gasp with it's heated up with,or it's generated by gas.but the degass is a very efficient procedure and finally creating here.at the energy for the building itself.eh and also some components where we have getting back. let's say water or other devices so.so in principle,the message is that the basic message is always that that's a complete concept of integrating electricity and water.and try to get heat from the different devices and distribute them in the building,so its heating air conditioned ventilation.and also illumination.好的，那我们这边也是可以看到啊，它的整个的这这一套装置啊，前面也跟大家大概的讲了一下这个图。图对吧它的呃，它的整个建筑，它包括它的呃供暖对吧，然后它的整个的呃呃，这个包括air condition对吧，我们的空调系统，然后新风系统对吧，这个。ventilation就是它的通风系统以及它的照明系统，都是集成到一起了，也就是说它这边的这个地热的装置对吧？它是。呃，它是用了这么一个这个呃，这个呃，它这个装置呢？地热进去以后呢一部分呢？它可以去产生电能对吧？去用于我们的照明，然后呢？另外一部分呢？就是呃，到我。我们的这个热交换机这边对吧？然后呃，产生这个热水，然后呢？呃，这边呢？是一个冷热交换，然后整个的循环过程，那这个整套装置的，包括它最后的呃，这个。呃，水呢？一直是冷热呃，冷水和热水都是又呃，再采集回来对吧？整个是一个循环的，所以说呢，它的这个能量的浪费呢，也是很低的。那我们这边呢？呃，也是它这套整个系呃，这个循环系统它的好处呢？就是我的呃，能源对吧？首先它的。呃，它的能源的这个呃运用对吧？它不是是单一能源的，而是呃，比如说我们一般来说建筑它就是用的这个电能啊，或怎么样的，而是它是用了这种。呃，这个比如说用一些再生能源，或者说是用一些新能源，或者说是用别的一些，对吧？代替能源那呃，第二个呢？就是它的整个的能源的利用率是很高的，然后它的这个。呃，所谓的呃，浪费的地方对吧？尽量的避免它的浪费，然后呢？也是实现它的这个可续可持续，以及这个循环利用嗯。嗯。then the next point is er here a little bit better explained I was wondering the english word for the German would for gasp.gasp I sum.呃。is in principle a special way of providing a.the air in offices without air duct,air ducts are the channels in in in on the ground floor.where we are getting,let's say the the air in into the buildings without having,let's say.the tubes everywhere,so we have a lot of,let's see kind of.especial technologies which are bringing in the trying to reduce on one side energy consumption but on the other side also making a functional wind or air condition in the.the buildings so the WINDOWS with still tilt functions,vertical transfers,flow system is also foreseen.eh,the heating cooling office there's only one system and in the data management we have a let's say a building control system.which is trying to accelerate in a building the temperature when we have sun.that on the side of the sun,the of the Sunny side of the building,the temperature is taken out or is removed or is mixed with the other.parts of the building mostly it's like the south part of the building western and south part is warm or eastern and south part is warm.while the north and the western part is more cold,so what they then try to do ise muse this temperature difference to.to accelerate the temperature in the building.yeah,oh or maybe even the uhf oistish kite,no the.好的，那我们呃，其实呢这这个呃，用了这么一整套系统啊，它一共做了呃，它可以代替我们现在这个建筑里面的很多的这个设备对吧？第一个就是我们的呃，这个加热供暖的设备，包括我们的空调。对吧，包括我们的通风系统，然后呢，另外还可以，就是满足我们的照明系统，它的这个呃，对于这个能源的需求，对吧，它可以有一部分就是。去供电就是它产生的能源，可以去呃用于照明那呃，我们这边的这个建筑啊，就是它呃在。建造的过程中，它有几点啊？就比如说像是我的窗户呃，我们国内比较少，但是现大家上回来德国的话，就看到哎，很多的窗户都是这种可以带倾斜功能的，对吧？就是呃，像我们。这个呃，国内的话一般都是窗帘，而不是但是大开，要不然就是关对吧？它这边德国呢，一般的窗户它也都可以，就是这种倾斜开就小开的那种窗户，那就可以呃，所谓的有一个垂直的横流系统。那另外呢呃，包括它的这个呃呃，这个办公室的空气的交换呢，这个gasper它其实就是一种这个通气系统，但是它不需要那个。专门的风管，它就是呃呃，所以说呢，也省掉，因为我们平常呢去做呃传统的那种呃呃，这个。嗯，我们以前的建筑的这种哎，中央空调什么的都很多，都要布很多管子什么的，对吧？它这条系统呢？就是呃，是不需要风管的，那另外呢？呃，它的整个的。呃，办公室的这个呃加热对吧？包括制冷呐，只需要一条一道系统，不像我们现在哎，那个呃传统的对吧？就是我这个办公室的业务一。一台空调又有加热片什么的，它这边都不需要，只需要一套系统就搞定了，那另外呢，它的整个建筑呢呃，我们现在也有很多的在说智能的建筑是吧，智慧建筑那它。在呃，它每个呃房间对吧？它它它都会有一定的这个传感器，然后去监控每个房间的呃，比如说温度啊，湿度啊，或者说它的光照度对吧？那我可以有效的去调节。呃，对于它的供热或供暖对吧？然后呢？去调节它的这个呃，比如说一个房间的湿度，或者说是它的这个呃，照明都可以通过我的这个。呃，data management和building control去做对吧？那像我们呃，这个典型的就是诶，我这边是朝南的房间还是朝西的房间对吧？那它有可能在白天的时候。是这个大呃东东边儿热，西边儿冷，对吧？然后你可能下午的时候西边太阳就过来了，那我就是根据这个呃building它每个部分它的这个。呃，在一天内或者说不同的季节，它的这个温度的不同，我去呃，适时的去调节，而不像现在我们一般来说，供暖系统就一一样的，对吧？你要不然的话，就人工要去调，那它这样子呢，都可以，就是智能化的。自动的去调节这个东西，然后呢，也是来呃，根据需求分配，这样子也可以节省很多的能源。here and then also the illumination where we try to use LED techniques and also switch off the the the light in case nobody in.er,so we have motion detectors which are putting in light in case somebody's in and after time also switching off.this is also a production in the will house,where everywhere is e liddy techniques should be implemented,although we know.that in old buildings,this replacement has not been fulfilled everywhere. this is not only because it's a lamp discussion,it's also an.e MA transformat or a discussion or we have to replace even that sometimes the transform a tors in order when we want to use lad techniques.and in remote places,it is very or in places where which are old. nobody wants to invest any more.and then the compressed air supply speed regulated er and the use of waste heat in principle. it is always kind of.tell my utilization of process water when we look into the paint shops there,we use also kind of water which is heated up and this water.which is heated up and which is then maybe aed for cleaning,then also the the thermal utilization that the the energy which is in.is taken out and put into the heating of the building itself.嗯，好的，那在这个呃照明这端呢？当然，我们现在也是很多的都已经开始用，都是换掉那个像工厂以前的那种老的灯，对吧？都已经换成LED了，那ld呢？还是很省电的。另外呢啊，包括呢，也会去装一些呃传感器，对吧？这是我们的这个移动传感器，就是呃，如果说这边没有人的话，那它的整个照明系统就会自己。呃，关掉对吧？那嗯，像这种呢，也都是比较常见的嗯，那另外呢？呃，包括我们的就是有的可能。在仓库啊，或者说是在我的这个生产区间呢？呃，车间呢？我现在也是渐渐的用了这个LED的光源去替代，然后呢？呃，包括呃呃另呃另外一块就是。呃，我的呃，这个。余热的利用对吧？就是呃，因为我们在生产的这个车间里面啊，特别是像一些呃做。锻造啊，或者说是甚至像一些油漆车间，它都会产生一些呃。热量对吧？就包括一些这个废水带出来的热量也好，包括我的这个有的一个加工工艺里面，它需要加热，那像这些。其实就会呃，它可能需要高温，那我出来的这个余热对吧？余下来的这些热量我怎么去合理的把它利用起来对吧？还可以再。比如说加热我们的水，然后然后再到我这个系统里面作为我的热水系统，对吧？然后呢？包括我这个压缩空气。去供应啊，然后呢？去进行一个速度调节，包括我的整个的嗯，这个废水对吧？是不能说是废水，就是说这个我在这个冷热交换中，我会。用很多的所谓的过程中，要用很多process water，对吧？这个过程中呢？用的水。我去，怎么去呃更好的进行它的这个热呃，它的热量的应用啊，那这边呢，都是我们去会去考虑哎，所谓的可持续性对吧，所谓的循环系统。那这个呢呃，都是我们这个呃，在呃plan的时候在这个计划的时候规划的时候都是要考虑的部分嗯。um,your study programme where you use a lot of advanced techniques er they are planned or intended to be used in factories.but they can be also used in general for building controls,for buildings which are not necessarily.factories this can be office buildings. this can be administration buildings and so on,so this knowledge we are providing here.or you are learning here is can be applied widely even in other ranges than industry opera,or let's say of this distribution centers.嗯，那像我们这边呃，就是我们本科里面呃，大家现在呢给给的课程设置也是牵涉到方方面面学到的技术，对吧？那呃，其实呢？呃呃，大家学到的这些呃，包括软硬件的等等的技术，它很多的时候呃，包括我们的一些芯片也好呃，这个数据处理也好，它不仅能用在。呃，我们这个呃生产啊什么的对吧？我们也可以用到像像这种建筑啊，包括我们的这个建筑的数据管理啊，包括我们的一些这个规划的这些管理里面对吧，都可以去通用的。now,what is also part of this legal point is that we should have combined heat power refrigerator.that photovoltaics should be used as much as possible. we Germany is buying a lot.of photovoltaic components from China I think that the Chinese side is supplying.of far more than fifty percent of all for that,for the voltaic's equipments.thermal solar plants as well as cooling geothermal energy and typically we have tried to get reach a level of eighty percent a heat recovery.嗯，好的，那像我们呃第三大块呢，就是它的整个的能源的供应对吧？那我们现在也是说我希望能够找到更多的。呃，能源的来源对吧？就是不不是，比如说一个建筑，我不是单一的，比如说只用电呃，那我希望是能够呃找到更多的，比如说可再生的能源，或者说一些绿色的能源，对吧？那像这边呢呃，第一块呢，就是我们前面也说到了它的这个呃，加热和制冷系统是一个呃，所谓的这个结合起来的系统对吧？它是combined的，它是一个。呃，冷热系统，它是呃一起的对吧？然后呢？呃，像我们的整个的呃，这个呃ll呃rlt就是这个下面解释了叫这个呃hor mlo of tetachinish就是我的整个的室内控制。间的嗯，空气空气的这个循环的技术呢，它能够嗯，把80%的热能都给嗯。重复利用回收回来，对吧？把80%的热能都能回收回来，然后呢？我们呃，这个绿色建筑很多呢，也是尝试就是去用光伏技术对吧？我们也知道中国是。呃，光伏或者说光能呃，这个供应特别是像我们的这个太阳能板啊，等等的就是出口大国，那欧洲有段时间也。对中国其实有一有一点，这个反倾销中国的东西啊，就是呃，那世界上大部分的这些光伏产品都是我们中国制造的。那包括我们的这个地热的一些能源地热能对吧？然后呢？包括这个太阳能的发电站，然后呢？还有一些这个冷却的系统，那等等的这一些呢？呃，就构构成了我一个多元化的这个建筑是一个多元化的这个呃，能源的呃来源，而不是是单一一个的嗯。OK um,I think we have three minutes. yeah,I have to switch to.now erin this last slide,we have explained the different factors and elements so.when we are having a green,when we build a new factory,we have to think we can call it green planer so.a somebody who is a general planner who has to consider the green factory,this is building structural framework electricity.servicing systems like water maybe and out of facilities as well.then,the close optimization of processes in production logistics organization laboratory resource efficient manufacturing green building logistics and green logistic green production.and this finally is the sustainable enterprise and whicher pushes an environmental conscious image to their customers.嗯，那像我们这边的绿色工厂呢，也是呃，未来这个工厂的一个趋势，对吧？那我们前面之前也一直说哎，智慧工厂呃是一个趋势，对吧？那个绿色居。工厂也是，就是特别是对我们的有一些大企业啊，大家有时候看一些嗯，特别是像这个欧美的这些大企业，生产型企业，它就很喜欢去宣传。呃，自己是一个green的对吧？一个绿色的企业，或者说是一个可持续发展企业，那我们现在国内也经常说，唉，我们要这个呃，注重这个可持续发展对吧？所以说呢，这个绿色工厂呢，也是未来的这个。呃，一个发展的一个趋势，对吧？包括我们上节课也跟大家讲呃，它这边呃，欧盟呃，包括德国这边，它每大概十年会有一些新的标准过来，对吧？我的呃，现在你比如说要新建或改。进一些厂房，你需要呃达到我的哪些的？这个环保方面呢？或者说是这个呃绿色方面的需求，所以说呢，这一块呢，也给大家花一点时间来讲那呃，特别呢是我们作为。为呃呃，你们学完以后对吧？我们是一个planner对吧？我是一个规划者来说呢呃，现在有的人呢也会说哎，我是一个green planner对吧？我是这个会关注啊，包括有一些大的公司，它也会去关注说。这一点你要帮我考虑到我的这个环保和可持续性的方面，对吧？那我这边的。这个怎么能够呃，把这个企业的所谓的这个可持续的企业的形象树立起来，或者说我是嗯，能够对外树立一个我所谓的对。环境呃，对环保方面是有呃，是比较这个正面的形象，对吧？那呃，包括我整个的建筑对吧？建筑的它本身的planning，包括它的这个结构，包括它的。唉，用电啊，或者说是它的整个的这个嗯呃，里面和外面的一些。装备对吧？再加上它整个的这个生产流程的一个优化，包括物流和组织整个的这个它的组织架构的一个优化，再加上呢我的嗯。我的这个resource对吧？它的能源的利用和它的整个的呃呃green building green是不是就是绿色的呃建筑物？和这个生产一起，构成了我所谓的可持续，或者说是一个正面的呃形象，就是对于我的这个呃。一个绿色工厂的形象OK呃，那我们差不多晚了一分钟，那我们现在休息一会儿，休息五分钟回来。嗯，好的好的，let's have five minutes break。so it had AA duct. that's where there's meet him,green and g boyd.t.unless it's alix ir shown,that's me the same a greener bulge. a greener public and bessie n neer.what am owing cyeah fatigue and clean by does this monstrous inferior in free of other scanty MA bajo it is i safavi sht ish da smal it is screener in pala bunch state.t had a whole her eat that while the old super longing was,can you credential damascus these? these is super long inge gab boiled is in twenty twenty tricycle. he had aed in operation.嗯，我的我的look linga god，yeah。我就开始回。啊，here is love you，i can take can't squirt the moment it isn't stuff，it was my z。so this for you.呀呀呀。刚才怎么拍那么多了呢？bad.第一题。39块钱一个。啊it is for。嗯，第二个就是考试这种。yeah,yeah.t.t.不要弄此外，压根一个人啊OK？bevy lyagging isn't no hi mera mli mazun arch deer grouped ye ts ergo no my Mark come knock male in't a group e miter go no my.呀。o.你好。嗯，是这么的。t.感受的嘿嘿嘿。是不是有设计感？那诺dguperem is kleiner emit's after woods again YY yes d the gup er is sing uo US to the essence ya na dis es yer。dist yer dist you dis find I sty on dishy on ti sty on dish yon ti sty on dist yon dist fint。哎呀。我。nagutafezzintz int weir yet loudly to his asshole asked marlborough a lid ser foley z UN gen BA nts wight malice Emma e trans passer.呀，是这么的。杨明的生产表和孩子挨了双边线忘车空拖了。yeah,yeah,that's why it's this young. I'm going to cut a so for over a year.it's a special the others were all vaguely,I know schwa kh they hadn't,I know schwa khllahaber t's business of school is only for US to show.嗯，so is this like the flag of that sighting UN duch edit？嗯，做clean the vitamin。好的，那我们继续啊，就是这个绿色工厂呢，刚才前面也跟大家说了啊，就是我们以未来的工厂的设计，包括我们。我们的呃，这个发展趋势对吧？之前也跟大家讲了有呃，这个两大趋势一块就是智能工厂这一块对吧？一块就是这个所谓的绿色工厂。那呃欧盟呢？对它也有一个比较详细的一个定义啊，就包括我要符合哪些标准，那这边呢？呃我们也。在这个project planning或者说在我们的factory planning这一块呢，我们也呃有这一张表格啊叫呃，就是five faces to green呃factory就是有那个。呃，我们去迈向绿色工厂的这个五个阶段，五个步骤好。yeah,this is the five phases e rander. this is has been developed,this concept of the five phases er.because it is this traditional here,they put it is said integrated factory planning,but it is traditional factory planning.of course,integrated means it is more advanced than just non integrated factory.but what is more important is,how can we come from a traditional planning into a designing of green factories? what is important for thinking about that?and we will go through this quickly,but for me it is more important that we understand the differences between.the two concepts I try to enlarge this a little bit so starting with number one that's a start determination of goals.AH,here that the integrated factory has a vision of the employee.employer,there's a brainstorming where we look,how the employer can get a better.better environment,better conditions in the factory,then we have some strategic specifications which are more.er to the business development of the company,then production and location strategy,this means what to produce,where to produce.than the technology roadmap and a common understanding for the factory now when we talking about the green factories.呃，then it is呃。these aspects are not.invalid but er some some additional goals May be there er and to one point is motivating owner.for resource efficiency,so to look everything here as well,but considering the resources and energy resources specially.then,the project requirements for this,this kind of green aspects resource potentials for building production logistics and administrations.to to consider them as well already right from the gold side used of sustainable materials and claimed to宪of the buildings。certification plays an important role because certification can guarantee later,uh,let's say that uh.this building or these supply chains comply with regulations.and which have to be proved by certifications right from the beginning?嗯，好的，那我们之前在导论的部分也给大家讲过，对吧？我们的这个factory factory planning有五个步骤，对吧？那我们呢？呃，包括这个准备阶段以及实施阶段那？呃，第一步呢，是我们一般都是要来设立一个目标，对吧？那像呃，这边呢？这个哎，我们有一些特殊的一些啊，包括我们一开始的这个brainstorming啊，包括我们要。建造一个哎，大概的方向对吧？我就要在战略上大概确定，包括呢选址，还有它的整个的一个呃技术的一个路径，对吧啊？那我们要达成一个共识那。那呃，在那如果说我要做这个呃green factory对吧？要做一个绿色工厂呢？在它的这个传统的设定目标的基础上呢？我们还要再加上这些绿色的环保的成分，对吧？首先呢，我在一开始的阶段确定目标呢，就要让我的这个呃拥有者对吧？我的这个。呃，我的这个设工厂的这个呃，拥有者去设立一个，或者说让它更有这个动力去做这个节能，或者说是能源的高效利用，对吧？resource efficient。然后第二个呢，就是我们的整个的嗯project对吧？我的整个的项目也是需要呃，需要一开始的时候就有这个呃，对于我们这个绿色或者说是环保的一个想法，对吧？呃呃，所以说呢，它的这个不仅是它的建筑本身，包括我的设计的时候，我的生产对吧？我的物流环节以及我的整个的。呃，行政结构对吧？组织架构上面我都是需要有这个嗯，所谓的对于能源的这么一个。这个呃节能环保高效利用它的这个潜力的一个发挥，对吧？另外呢，我们也要呃，这个包括它的用的一些建筑材料，或者说是一些材料呢？我们也希望它是用的一些是。可持续的，或者说一些节能的材料，对吧？用一些这个嗯。呃，可持续的一些材料，另外呢啊，包括我们刚才也说了，就是它的这个绿色建筑，它也会有专门的一个。呃，标准对吧？呃，是也是希望一开始的时候，我们就要确定说我的整个的呃设计呃理念都是要符合我的这个呃，绿色标准的。yeah,and then the next point is the socalled structural planning er and erin integrated factory planning in the structural planning. we are oriented to business processes.we look,how is the business? how are the flows of goods materials er of humans? and this they are in the center of the design.er,the integration of production logistics and building means that er everything should be integrated in order not to lose time as if with.with buffering times or then,we have an energetic structural concept,so even in the integrated factory energetic structural concept is already considered.but it's not in the,in the,in the key. let's say it's not a key element.then we have ideal planning with concepts and variants. this means we are.investigating options with greenfield and options and their corresponding variants.and of course,recommendation and economic efficiency,which is then,let's say,the conclusion of this,this.level,but what is the n of the green factory different? well,it starts with the compact shape of the building.last time I have explained to you um also something like the.AH,the smart factory,the factory of for building the smart.which has the function of a cross it looks like a crosser. this cross functionality is logistic oriented because a lot of suppliers have direct access to the building or to the.em to the production sites in the building,but from my green point of view,we need a.compromise because the shape of the building should be compact,this means the surface should be as small as possible,which is of course a conflict.er,compared to the logistic oriented quartet well,then that it's an energy efficient design of the facade this means.um,we should use for sites in.considering eventually even the power of the sun,then energy supply at the use of renewable energy,this means we have to.eh look for our material flow that it fits good to the energy supply and also the renewable energy.er,the heating ventilation illumination are important and already to consider in the structural phase.and the use of energy,the total concept of energy,which also has to be already considered on the on the structural side.嗯，好的，那我们这个五步走的呃factory planning的五步走的第二步就是我们在这个。组织结构上的一个规划对吧？structural planning那呃传统的我们的这些建筑呢？对吧？呃它一般来说呢？在这个层面上，我们要不仅是要考虑到它的这个。呃，本身对吧？第一步的它的战略层面，那我也要考虑它实际的，在经营层面对吧？在我的呃业务流程上，哎，我是不是呃像这边我们看到它说integration of production and building对吧？它的整个的。生产物流建筑一体化，那像这一块呢，就是一个很好的案例，就是我们上一节课给大家讲的这个呃，这个smart的那个呃，在呃，法国的那个工厂对吧？它是一个十字十字形的。那它这个十字形其实不仅仅说哎，它长得好看或者什么，它其实是为了考虑到生产以及它的物流对吧，以及甚至是它的这个交流呃，互相之间的这个沟通信息沟通信息交流以及它的一些行政上的一些考虑。那虑那呃，那我们这边就要看到啊，就是它包括一些。呃，像呃。就是我为了这个生产组织结构上和我的这个绿色，是不是符合我的绿色的呃标准？这个不一定对吧？那呃，比如说像我们有的这个呃，公司它可能这个就就像前面那个十字形。它可能呃，对比来说，我们这边不是说如果要节能的话，你要整个建筑要compact嘛，就是要呃更紧凑嘛，对吧？但是它有可能诶，因为我的这个生产需求，它可能。就不能做到呃，很紧凑对吧？因为它的整个的呃，整个的流通，或者说它的整个的呃，这个生产线的安排，它可能就做不到，那这个时候呢，我们怎么去做一个？唉，互相之间的妥协，或者说是我们能不能够呃达到呃就是呃尽量的能够满足，说我尽量紧凑一些对吧，因为紧凑的建筑呢，它就比较能耗会比较低嘛就是。呃，那另外呢？它的整个的呃，这其他这几点我也就不赘述了，因为前面已经跟大家讲过了，包括它的立面的设计啊，它的能源供应啊，以及它的这个呃，热热能风扇三合一等等的，对吧？这个要考虑到全局。就是在structure结构的方面去，就考虑到它的整个的能耗的问题嗯，以及供暖呃，供供能的问题嗯。now,when the when we go through the plan of concept,I will not mention everything,but the plan of concept is here very traditional that we have functional modules er.era plan of functional modules or area allocations,we have the concept of the structure of the work,especially the how the work is organized maybe the jump shop discussion.eh factory logistics are there we are going into a real planning here on that level. we maybe we might be on a green field,but here we are not in the green field anymore.here we have to consider the reality as it is,then we have the blueprint planning and also term it planning. this is addressing.especially,the municipalities which is then trying to make sure that the plan of a factory fits to their requirements here,it is mostly.or let's say,among others,but mostly what about the people in case of fire?where are they going? how can we make sure that there are nobody is harmed and secondly traffic,and then the plan of concept considers mostly this.and of course,the estimation of investment and costs wanting to know for the shareholders how much money should be invested on the other side here on the green side.we have also these aspects,but the aspects are more concentrated on the materials and are they based on co co emission.er standards er,then the direction of the building er trying to profit from the sun.eh,in case it is,uh,Sunny,it is a warm area or opposite by cooling.by by a coach door,for instance,trying to avoid exactly the exposure to the sun.AH,then a supply chain and disposal planning is a very important point. how can we get a good disposal planning?and a process of approving because the scientific s are so important for the future existence of the factory,so right from the beginning early beginning.the certification companies are involved in order to get later the宪s。嗯，好的，那我们的这个fact planning的第四三步对吧？plan of concept我的这个概念设计划概念设计那呃，这边呢也顺便给大家把之前的这个步骤再给复习一下啊。那我们在这个概念的设计的呃里面呢，当时我们也说到了，就把我这个第三步的时候要做的是每个呃不同的功能区块，对吧？模块空间的一个。呃，具体的一个规划，包括它的分配方案以及我们的整个的这个呃，包括工厂啊，物流结构的呃，这个不同的空间的呃，结构的一个呃概念要出来对吧？啊，包括我的这个real planning就是我的真实的场景的一个规划蓝图，规划包括一些许可证，对吧？我这个时候就要去看，唉，我有要去申请一些呃许可了，那最终包括它的投资和成本的这个预算对吧？要去具体的估算出来，那在这个基础上呢？如果我要达到这个绿色工厂的需求呢？我还要在这个基础上再来多看一点东西，对吧？包括我使用的。呃，这个原材料，它的质量对吧？呃，那比如说像我们现在很多的时候就可不可以去用一些哎，这个环保型的材料对吧？呃，或者说是一些可再生的一些材料。那呃，另外呢，包括我的建筑整。个的前面也是说到了哎，它的这个朝向啊，或者说用窗的啊，结构啊等等的对吧，它的每个的职能不同的职能区块以及它的这个建筑，它里面用的这些。呃，设备对吧？那比如说像我们刚才那种三合一的设备，我就不用再去唉，再去单独去装空调或干嘛了，对吧？另外呢？唉，我是不是用了我的可再生能源？另外呢呃，包括我的这个整个供应以及我的回收，或者说我的处置不同的材料的这个计规划对吧？比如说像这种呃。废热啊，废水啊，我怎么去供应能供应它让，然后怎么去回收它对吧？然后呢？整个的因为我们的所谓的绿色，它有专门自己一套的这个certification对吧？有专门的一套标准和这个审核。那我这边呢？呃，除了这个呃，在呃，传统意义上的c那我还要拿到一些这个。这个呃绿色认证的一些审批流程，我也要去过一下嗯。now from the let's say greenfield from the ideal planning to the real planning,we come to the step four to the detailed planning.where we have the details of of the unit of the functional units,each workplace eventually each lift.everything which is a detail in this factory is then is considered here,so we are not designed in functional.modules we are designing in systems conveying systems storing systems production systems.and then here it's start forbidding,looking for suppliers who can offer these,then find out who will finally do the construction,the logistics,the production.and eh or the announcements are,and then later the recommendation for the award of the contract who gets finally the task.in contrast with the green factory.we ask for er offers where sustainable materials are used erso description of the materials,properties and qualities.and then figuring out what are besides the system planning,the details planning of the system.it is the uh looking on to how our energy aspects consider and of course that during the execution.resource saving execution,so even the execution is already monitored from an energy consumption point of view.嗯，好的，那我们这个工厂规划的第四步detail planning对吧？细节规划那详细规划的这个呃，我们之前也给大家讲过对吧？在这一个步骤的时候呢，我们要对每个。呃，不同的功能单元进行一个详细的规划，包括我们的整个系统进行一个呃，具体的detail planning对吧？那呃，在这个时候呢，包括我们要做对吧？要做这个招标了。那呃，包括我们的这个施工方，这个物流方对吧？还有生产的一些公告，那我的这个包括呢？呃呃，授予不同的这个呃合同对吧？这个我的这个承包商他不同的这个。呃，具体的一些合同的建议那呃，在这个阶段里面呢，如果说我是要做一个绿色建筑呢，那我这边就要来看诶，我我的这个它前面我是想用这个。可持续的这些材料，你是不是呃真的是可持续的材料对吧？那我这边要来做一个检测，要做一些测定，那包括我的这个具体的这些材料质量的一些。啊描述对吧？以及它的哎，我这边是一个环保的建筑，或者说是在能源利用上的这一块哎，具体的呃，能源方面要逐项的去列出说哎，我是怎么一个规划以及呢你呃？前面的这整个我的建筑的这个节能，或者说是节能节省资源的具体的执行情况都要在这个阶段。呃，也是同时的来进行嗯。um then in the er realization step,we also have here some.er,let's say differences er. and of course,here in the realization is the participation of the award of contract supply and claim management supervision and coordination.acceptance of construction planes monitoring of run up,so these are the real classical.let's say tasks of a project management on that level,but in realization on of the green factory,we have to do more. we don't have,we do not have only to look at the camp.the company or the building is erected,we have to also to check and prove that the material qualities are fine.the energetic aspects are considered and not because of money shortage reduced.um then,resource a savings execution trying to reduce waste wherever it is possible er and construction construction process.with waste separation saying that there are some materials which can be recycled,other ones they have to dispose d,other ones have to be burnt eventually.er,so we have to write from the beginning a look that whatever in its waste is is generated is finally separated entered er.and provided to different er consumption streams or lines.嗯，好的，那到我们的工厂规划的这个第五个阶段realization对吧？实施阶段那在实施阶段呢？我们传统的这个呃，这个步骤呢呃，也是。这边列出来了，就都是一些传统的步骤，包括我们的这个呃，对于它的施工啊，包括物流啊，生产啊等的这些的，这个验收对吧，包括它的监督协调，我这边。哎，是不是按照工期和计划在在在这个做对吧？包括各各种的不同的监测啊，也要启动起来，那如果说是有问题的话，那个呃要跟供应商或者说是它的这个。呃，一些索赔的管理那呃，同时呢，我们如果是要做绿色的这个建筑的话，呃，那在实施阶段呢，我们呃，还要做哪些工作呢？就包括我的这个。呃，材料对吧？我的这些材料的质量的一个监控，具体监控它是不是符合哎绿色环保材料或可持续的这些材料那呃，另外呢，包括我能源方面。呃，是不是达到我的这个节能的减排的这个标准对吧？那另外呢？呃，我的这个呃，资源节省对吧的执行是不是呃？也是按照我的这个标准，它也要进行一个控制，对吧？呃，另外呢？呃，包括我们现在很多的在做这个呃，垃圾的分类吧？呃，这边的垃圾分类呢？也要更复杂一些，对吧？它哪些是可以回收的，对吧？我也可以，比如说再重新回到我的产线里面，或者说是诶，有一些废水，或者说是热水我。是不是能够再回收的？那有一些材料可能就不能回收，那我进一步要怎么去处理？怎么去分类？怎么有的可能要燃烧掉？有的可能是要去分解，对吧？等等的那这一块呢？也是我们。在呃，在这个实施的过程中，要去具体的监督的嗯。now er,of course er,when we look into these requirements here,how is it in reality? what happens in reality?because we can make beautiful slides,but what are the real projects? and here we have a list of real projects er.eh maybe most of the names are not really familiar,you are not very familiar,but eh?嗯。but er er,what we see is that we have several levels that the process transport,the production facilities.the building site and the production design and there are categories where we save co two saves.eh and of course erlanxes,for instance,this is one of the big chemical plants er,so they are going for internal rail transport.er and by doing internal rail transport instead of trucking transport,they can save er considerable co emissions.er here then are other companies who are needing drying processes in their in their production systems. then we see can with drying or we can save a lot of money or time.our energy,especially when it is done in an intelligent way and when we look then into the production facilities which is maybe more our,our focus here.er when out y we look into the out y the energy recovery in the car body Warehouse can can already be done.however,the Warehouse itself is not that much,and we see also that the saving is quite limited.but it is there,and what is more important and galvanic production,the galvanic facility is coating pieces,metal pieces.eh,it is clear that in a galvanic environment you can uh you can save very much more energy.in the painting,it is the same the paint shops are typically highly consumers of energy because they have to heat up the water and the facilities there.eh and berger has considered something with water treatment management,so what you see here with the with the with the factory.they do not do everything at the same time,some have always they are focused on a special topic and add the other green elements to the factory as well.er and er when we look into this building site,then we see that BMW is cooling a certain area with the.by the use of groundwater,so they have water in the air which is a certain temperature,a little bit higher than the.and then the information central area is or the.eh,the research eh,the the research center is then eh,eh,yah.e cooled with with groundwater,so in this way we can save a lot of er.a lot of energy and sometimes it is also the corresponding to fifty two machines and two shifts or.a persons in households and soon you can compare this,but in the end um what we can see is that factories are.some send up factories are really sensitive to that,while others are um not so sensitive,but they would like to contribute as well.嗯，好了呃，看始读b行可爱的猫。呃，那呃，我们前面呢，也是给大家来说啊，就是为什么我们这边也是花了一定的篇幅来给大家讲绿色工厂？因为这边呢，我们看到是一些我们可以说是一些成功案例，或者说是这个绿色工厂的这个best practice的这些。呃，真实案例啊呃，这个也是，包括像我们教授和呃，这个ag plan它们一起来做的一些呃，公司的案例，因为现在包括我们可能在国内也是在。呃，这边欧洲也是它现在很多的时候去呃，做我的一些这个新的项目啊，包括一些诶呃，工厂的呃，新建也好改建一些项目。这些呃指标呢，就包括我们诶co two的排放啊，或者说是我的节能，你说诶每年这个节能你能够为我的这个。呃，公司省多少钱对吧？呃，这些指标呢？都是比如说你最后能不能获取这个项目？或者说是呃，我这个公司非常看重的这些。呃点啊，就包括大家可以看到它这边的这个best practice呃，这边的这个几个案例啊，有可能有些公司大家是认识的，有些公司它。呃，可能嗯，不是很熟悉啊，就像我们这边呃宝马对吧？BN w它的这个呃，它的这个co two的saving它是坐在这个building本身的对吧？建筑本身的。然后像我们这边或者说是像这个奥迪等等的，它的是在呃在不同的领域来做我的所谓的co two的saving，就是它这边是在production和facilities，就是说是在它的生产。和我的这个制造领域呃，这个上面对吧，具体的这个。那职能部门里面的那有的呢，是对建筑本身进行一个呃优化，有的是对于我的这个生产呃环节进行优化，有的是。对于我的，比如说运输和我的这个呃过程处理的环节，对吧？就像呃，它可能诶，我现在呃，以前是用卡车的，对吧？现在我是用火车来运了。那我这边也是可以呃减排对吧？那然后呢？包括我的这个博士利士乐对吧？他这边呢？呃，也是呃，做了一个叫这个automation solution center，那他这边是从。呃，产品本身以及它的设计方面去做到一个co two的减排，那像这些的这个co two的减排呢，现在特别是对呃欧美的一些公司呢，特还有一些比较。大的这些公司啊，如果我说哎，我是一个innovation的公司，我是一个呃sustainable的公司，对吧？就是哎，这个创新也好，这个绿色也好，都是一个比较正面的标签，所以说呢。呃，在这一块呢呃，也是让大家现越来越重视了啊，就是经常呢呃，包括一些大公司，它也会拿这个作为自己的一个宣传点，对吧？那这个也是说明呃，我们在未来的这些。工厂设计里面呢，也是我们需要关注的一个指标比较重要的一个指标嗯。具体的案例刚才教授也跟大家展开了啊，他们做了一些什么，我就不再赘述了嗯。哦。stunnisa fresh brun in.那不是谁的粉？嗯啊。when we look deeper where we have had very big savings,this is for instance aluminium production.because aluminium production needs a lot of energy,we are in Germany in a bad situation,because we have a few energy resources or sources.and then those who are using a lot of energy,of course there we save the most money,because energy is so expensive.also,steel production is then part of that so aluminum,steel um and also for some some areas where we have. let's say during steel production.呃，我。八点八十四八点。uh,where,where,where hereby cut some.but again,mostly we can say er energy consumption is er er very high. everything where we deal with materials.steel,aluminium,ander by transforming the steel product.by by by hitting them up and doing something new,but here this is interesting a point where we are producing meat and sausages.em or when we are at considering the see h body shops where we recover.eh this so in the end what i can say is that eh eh there are some areas where we can save a lot of energy.and these that they have to be focused er mainly,although their regulations and ordinances consider all buildings and consider all.呃呃的。consider all the elements,but what we see is that on one side we are having a tent s tons of co emissions.but on the other side,we have to consider also the savings per year and or it is not surprising that exactly there where the energy is high.whether this,the seal two emissions are high also their savings in money is of very close. also,the kilowatt power.好的，那我们前面啊，就是现在绿色工厂，它的这个评评估的指标呃，有主要是两块对吧？一块就是我的二氧化碳的排放量。呃，那它呢？是以每年可以节省几吨对吧？t呃呃，就是每年可以减排多少吨呃？为它的这个标准对吧？它的这个。呃，一个单位，那我们这边的第二个标准呢？是呃，它的整个的这个项目做下来以后呢？我的呃，能耗对吧？能够呃，降低多少的能耗？以及呢呃，它的能耗降低以后呢？能够为我省多少钱？所以说呢，这边我们也可以看到在这个呃，我们的这个best practice的案例里面，我们可以看到这边是每年可以省多少千瓦时？对吧啊，那这儿呢也是哎，可以项目完成以后可以每年省多少欧元的这个经费那呃，因为呃，大家也知道前两年特别是这个德国。这个这两年的能源危机啊，就是所以说呢，也让很多的生产厂家，它现在就是都想搬掉了，对吧？因为这个德国现能源的费用越来越高了，特别是一些高耗能的一些诶，比如说像这种。生产铝的对吧？呃，包括生产钢铁的，他们都是耗能大户，对吧？那它的这个呃，用于生产的这个能源的损耗对吧？都是很大的，那我在做这些绿色可持续的项目，以后呢？哎，你看一下它这样子呢，每年可以省掉呃，省掉可能可以省呃，十几万二十几万欧元的钱，对吧？点bm v的这个项目甚至可能省到百万的钱，那在各个不同的这个环节，可能是一些生产环节也好，这是在我的这个过程环节里面去。省省这个能源呃，因为其实这个也是很逻辑的，对吧？我能源节省了，那我的二氧化碳排放量也相对降低了，那我的这个同样也省了这个能耗的经费，对吧？那这边呢？就是我们现在呃，现未来的这个工厂设计里面，大家越来越注重它的一个点，就是越来越注重green factory的这个点嗯。nower this er,and when we looker,when we try to make it more clear what we are doing or what is has to be done.then of course em.er,we have to consider individual projects,and this is a company,a principal very famous company,because they are producing the so called Emma and disney trucks.disney and TOR BO trucks and er so they are having the this d motors er as well for ships and power plants er.and uh,they are also produced in turbo engines with roughly fourteen thousand employees.at more than one hundred international locations,so the company MR nis well well known.eh but er maybe what people don't know is that they are also producing disney motors. by the way,er,just i don't know if you know that internet.is one of the main consumers of desal motels,so the internet is.is uh asking for motors,deal motors er in a special way,so that's really surprising.but when you know the reason it's not so surprising,it is that the dishing machines are always used as a backup.in case power supply goes down and the batteries for the computers,they are mostly eventually say can covered.time of one hour or half an hour to an hour where the electricity,the connection to electricity,electricity grit is interrupted.but once we need a longer time,then the motors of minor dota they are needed.in order to er provide a stable local electricity network,so they are backups for electricity generation.嗯，好的，那我们这边呃，前面也是给大家讲了一下这个呃green factory的一些标准，对吧？那我们现在来具体来看哎，我们这个教授他们做过的一些案例。那我们这边举的一个例子呢呃，大家我不知道大家有没有听说过这个公司啊？mrm mrm呢？是一家很大的这个呃，包括它的呃，传统式生产台，柴油机，还有呃，这个涡轮发动机的。这个呃，企业啊，那我们像现在的这种大型的，比如说像这个船舶啊，这个一些动力装置用的大型的柴油发动机，它是这个全球市场的，这个领导者啊。然后呢？它也是呃。这个全球的这个三大涡轮机发动机制造商的呃之一，那它的总部呢？是位于这个August book是在。啊，德国的奥格斯堡那呃，他他们家呢，就刚才教授也是说啊，现在其实是好像我们感觉柴油发动机是一个已经过时的东西啊，但实是是实际上并不是啊因。特别是现在呃，大家可能想象不到最大的这个呃，这个柴油发动机就是我们的dese MOTO的，它的需求者是呃，所谓的这个我们的互联网的一些。公司或者说是internet的一些维护者，因为为什么呢？因为我们很多的时候就是特别是嗯，我们现在的一些这个。呃，网络公司它的这个服务器对吧它？它是呃呃，平常当然是都是呃，用电这个24小时连续不断的供着的，对吧？但是他们也是特别怕哎，如果万一我停电了，那怎么办？对吧？然后呢？呃，包括呃，那我要保证我的这个服务器不要。中断对吧？我的这些存储的资料，我得还是在那边对吧？我的这个internet还得是畅通的，所以说呢，他们在呃这个维护端，它就呃。呃，储备了很多的这个柴油发电机，然后呢？就是呃，以保证它的供能啊，就是呃，万一的话，它的这个呃。它的这个电断了，对吧？它能够确保柴油发动机也能够跟上嗯。yeah,and they the planning was addressing,the painting process some designing some sort of,the transportation investigating the optimal transportation system.and a realization of the building,and finally fifty percent energy reduction can be has been achieved at such a planning.嗯，好的，那我们这边做的这个项目呢，它也是想要去呃包呃去优化它的整个的呃。涂装的这个空间对吧？painting process，它的整个的喷涂的呃过程去优化它，然后呢，包括它的整个的transportation system，对吧？它的整个的呃运输系统那呃。那我要重新去规划，对吧？从它以前的厂房已经在那边了，我要重新去规划以及实施整整个建筑的合理的应用，对吧？然后呢？包括能够让它能够达到节能的目标。那我的这个项目的目标呢？就是我能够经过我的改造以后，它的整个建筑的呃能耗对吧？能够节能百分之五十百呃fifty percent energy reduction就50%的节能。能够达到这个目标嗯。what is to know inclined films like?奶奶的，还没弄成，但是还是。judge vice up to his mother's ferris to n I'm for erf icer. besides this,a green building.eh,the classical requirements are still,uh,have to be complied,so the reduction of throughput time from five to two days down.so this is also achieved,and what we see here is the,the the painting which is done in the testing hall.eh,eh,this has been redesigned as well. so what we see then is that we have resources efficiency,efficiency in production.e by by increasing of capacity,reducing energy consumption and putting out or out of all the different.decentralized paint shops in principle when we go through all these details.em using a new dryer technology emit is a constant reorganization of all the processes considering then again.renewing them as adjusting them from a decentralized solution come to centralized solutions.when we look into these all the details,the companies offer a lot of options and opportunities to save energy and to.make a more efficient use of resources。嗯，好的，那我们为呃，我们这个项目的目标是为了让它整个的呃。整个的工厂对吧？经过我的改造以后能够达到这个50%的呃呃，能源的能耗的降低对吧？那呃，包括它的整个的呃，整个的super碳对吧？如果大家还记得我们以前。在呃，这个另外的一个economic那个课里面对吧？我希望我的整个的生产效率能够提高它的super time，能够从五天降低到两天，对吧？那呃，我怎么能实现这个事情呢？呃，怎么能够做做好我的绿色？工厂的改建呢，这个也是我们现在很多的公司在做的一个事情，对吧？把我的这个传统工厂改建成节能环保，可持续的，绿色的工厂那呃，他这边呢，也是做了好多的工作，对吧？呃，包括我的流程的优化，包括我的这个建筑本身的一个改进，包括我的这个嗯，这个system energy方面的呃，这个解决方案对吧？我的这个。呃，提高能源的利用率以及我的wastewater，对吧？呃，就是我的这个废水的利用率啊的一个提高，对吧？包括我的呃呃，甚至是它的这个。呃，能源对吧？它现在的这个能源比比如说我，我用这个呃，这个油啊，或用别的一些能源，那像它这边它能够达到这个目标呃，去改建我的预测环保，或者是达到这个节能的目标。它不仅仅是从一个方面去改进，而是多方面的，对吧？让我好比说在这边呃resource efficient in production，那它就要去。呃，让它的整个生产效率能够提高，对吧？那像他这边也是说到那呃，我这边是为了提高产能。去降低能耗，对吧？那就以前是，比如说是几个分散的喷涂车间，那现在呢？如果我用现代的这个喷漆和干燥技术呢？我就只要一个全新的中央大厅。去呃喷漆大厅去实现那新的这个生产结构和这个更新的组织工作组织形式呢，让整个工厂能够优化，对吧？不需要的东西能够去掉。提高了产能，同时呢，也节约了能耗，对吧？那它像别的一些就呃，这个建筑本身，比如说它通它提高了这个能源应用。用的效率啊，这边比如说它的这个通风啊，然后呢，包括它的整个的呃。精确它的这个呃，比如说是分段通风和变频通风对吧？然后呢？包括它的照明以及储新的这个涂装车间的能耗呢？就明显的就降低了，那我们也可以看到啊就。要达到我们的绿色建筑去改造一个建筑，它要做的事情并不是说哎，只要只要是一个方面，它其实是要从方方面面的去考虑的。an OK,that's it for today. I think yes,so thank you for being here,I hope you enjoy the rest of the night.好的，那我们今天先到这啊，我们大家明天见，拜拜嗯OK，thank you very much，see you tomorrow。see you tomorrow.拜。好。